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MACHINERY ISSUE

THE IRON TRADE REVIEW

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Alphabetical list of Advertisers, page 182. Table of Contents, page 55. "Where-to-Buy," page 120.
Opportunities, pages 175-176 Second-Hand Machinery, pages 177-178-179. Fill-in and Contract Work, page 181.
Manufacturing Sites, page 180. Engineering Directory, page 166.

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THE IRON TRADE REVIEW

Vol. LIX Cleveland, July 6, 1916 *No. 1*

Navy Will Need Heavy Tonnage

Plate Makers and Shipyards Will Rush Government Work—Pig Iron Production Declines Slightly

THE very extensive construction plans of the navy department will require fully 150,000 tons of steel plates for hull material and about 75,000 tons additional for armor plate and protective deck plates. The demand for the new war vessels, coming on top of very heavy business already on the books, will present a serious problem to plate manufacturers and ship builders, but all will do their utmost to rush government work and will give it preference over other business. The demand for plates for export continues very heavy and about 100,000 tons, principally for Italy, Japan and England, are pending. One domestic buyer is endeavoring to place 27,000 tons for next year. On contracts for shapes and plates expiring July 1, very little tonnage was cancelled. Many contracts were made some time ago for the present quarter at $10 per ton higher than for the second quarter and the strength of the situation will be more fully tested as specifying for the present quarter proceeds.

Of approximately 10,000,000 tons of unfilled orders on the books of the Steel Corporation, actual specifications amount to about 6,000,000 tons, an unusually large percentage. New Corporation business is somewhat less than shipments and the unfilled tonnage report for June probably will show a moderate reduction. One platemaker is endeavoring to buy a large tonnage from other mills. The demand for steel for the manufacture of locomotives is heavy. Some recent shell orders, including one for a million forgings, cannot be delivered until long after the first of next year. One large seller is sold up on shell steel to May 1. The Corporation has finally booked its part of the large Russian rail order, amounting to close to 200,000 tons. Independents are still negotiating for their share of the tonnage. The rails are to be delivered by next July.

The scrap market, which has been extremely depressed, shows signs of decided improvement, following the heavy purchasing of the Carnegie Steel Co. in the Pittsburgh district and reports of buying for the Gary plant. The coke market is also looking up.

Iron Ore

June made a new record in iron ore movement from the Lake Superior ranges, the shipments aggregating 9,507,576 tons, or more than a million tons greater than the record-breaking month of May. If the shipments from July 1 to the close of the season are equal to those of the same time in 1913, the total movement will be 52,561,002 tons, but it seems likely that unless the strike situation on the ranges develops more seriously than it has, the rate of shipment for the remainder of the season will exceed that of 1913. Some eastern Pennsylvania steelmakers, to whom ore has not been going forward as rapidly as they wished, although shipments are up to schedule, have been advised by ore shippers not to sell their pig iron in the open market until the ore situation more fully develops, but conserve is for their own use, and one company has announced that it will follow this policy.

Government Needs

Demand for equipment for the movement of the army toward Mexico is not heavy, but considerable inquiry is pending. The White Co., Cleveland, has received an order for 400 trucks for immediate shipment to the Mexican border. Demand for large quantities of tin cans has added to the pressure on the tin plate market, in which prices had already been advanced fully 100 per cent compared with a year ago.

Pig Iron Production

Hot weather, as usual, is having effect in reducing the production of pig iron and the output of coke and anthracite furnaces for June shows a loss of 150,766 tons compared with May, the June tonnage being 3,213,818. There were, however, four more active stacks at the end of June than at the beginning. Including charcoal iron, the present production is at the rate of nearly 40,000,000 tons per years. The output of furnaces for the first six months of this year was 19,381,954 tons, compared with 12,043,503 tons in the same period of 1915 and 17,529,658 tons in the last half of 1915.

MEN OF MACHINERY TRADE

Who they are **Where they are** **What they are doing**

James Fitzmorris, for 25 years master mechanic of the Chicago Junction railway, has been made superintendent of motive power of that road.

Clarence W. Vogt has recently been appointed general manager of the National Foundry & Machine Co., Louisville, Ky.

C. W. Lyon has become affiliated with the Lyon Concrete Products Co., Evanston, Ill., in the capacity of president.

R. D. Wilson, formerly general car inspector of the Philadelphia & Reading, has resigned his position and is now associated with the Grip Nut Co., as eastern sales representative.

John L. Corcoran, formerly associated with the Victor Auto Parts Co., Cincinnati, has been elected president of the recently organized Corcoran Mfg. Co.

H. B. Hoover has been made general manager of the Oxy-Acetylene Products Co., Chicago. He was formerly manager of the Turner Brass Works, Sycamore, Ill.

A. F. Orcutt has been appointed general manager of the Rivett Lathe & Grinder Co., Boston. For many years he has been associated with Deere & Co., Moline, Ill.

The Carlton Machine Tool Co. has been organized to succeed the William E. Gang Co., Cincinnati. Jack C. Carlton, formerly with the Lodge & Shipley Machine Tool Co., is president of the new company.

Louis E. Strothman, manager and chief engineer of the pumping department of the Allis-Chalmers Mfg. Co., Milwaukee, was recently elected president of the Engineers' Society of Milwaukee.

O. E. Thomas becomes district sales manager for the Terry Steam Turbine Co., with a territory covering Arizona and the southern portions of California and Nevada, with headquarters at Los Angeles.

Byron F. Stowell has resigned as superintendent and mechanical engineer of the Van Norman Machine Tool Co., Springfield, Mass., to become master mechanic of Barney & Berry, Inc., skate manufacturers of the same city.

Bertram G. Welchans has been appointed general superintendent of Stanley G. Flagg & Co., Pottstown, Pa. His former position with the company was that of mechanical engineer, in charge of manufacturing and machine design.

Robert Haig, who has been chief supervisor of Lloyds inspection bureau in the east for a number of years, with headquarters in the Bourse, Philadelphia, has resigned to become connected in a leading capacity with the Sun Ship Building Co., Chester, Pa.

Oskar Kylin, designer of several turret lathes and screw machines for the Warner & Swasey Co., Cleveland, has resigned to accept a position with the Foster Machine Co., Elkhart, Ind. Mr. Kylin was connected with the Warner & Swasey Co. for six years and during the past few years had held the position of head designer.

Charles A. Rowe, formerly with the Pittsburgh Steel Co., at Chicago, has been elected president of the Legancer & Rowe Engine Co., Chicago. He has been connected with the Pittsburgh Steel Co. for the past 11 years, for a time being superintendent at the nail and wire mill in Monessen, Pa.

Chas. L. Foster, formerly manager of the Akron district for the Westinghouse Electric & Mfg. Co., has taken charge of the sales department of the Electric Furnace Co., Alliance, O., under the title manager of sales. He has a had a long experience in the electrical line, having been for 13 years with the Westinghouse company.

Richard Martens, vice president and managing director of R. Martens & Co., Inc., New York, who has been in the United States during the past six months, studying the manufacturing industries in relation to the Russian market, has sailed for Petrograd, Russia. While in America, Mr. Martens completed the organization of the New York company.

M. M. McCallister, inspector of building shops at Schenectady and Lima for the New York Central Lines has resigned his position to accept one as expert for the American Flexible Staybolt Co., Chicago. Mr. McCallister was the first apprentice on the Pittsburgh & Lake Erie, was field erector of the James P. Witherow Co., New Castle, Pa., was in charge of the Roanoke, Va., shops of the American Bridge & Iron Co., and later was assistant foreman of the Norfolk & Western shops in that city. He was next appointed assistant superintendent of the Richmond shops of the Richmond Locomotive Works, after which he held positions with the Lake Shore & Michigan Southern, at Collinwood, O.; the Erie City Iron Works, Erie, Pa.; John Brennan & Co., Detroit, and the Weil Boiler Co., Indianapolis, Ind.

M. E. Cooley, dean of the college of engineering of the University of Michigan, talked about the development of foreign trade before the Michigan Engineering Club of Pittsburgh, at the annual dinner of that society, at the Fort Pitt hotel, Pittsburgh, Jan. 21. John P. Allen, head of the mechanical engineering department of the university, and Gardner S. Williams, a member of the board of directors of the American Society of Civil Engineers, were among other speakers.

R. H. Sweetser, whose resignation as president of the Thomas Iron Co., Easton, Pa., was to have become effective July 1, will continue his present office until his sucesser has been named.

David Dows, president of the Sintered Arc Co., Buffalo, and an official of the American Grondal Co., has returned from Plattsburgh, N. Y. where he was a member of the citizens military camp.

Jones & Laughlin Steel Co. Appointments

F. D. Grunder, formerly with the National Tube Co., as assistant general sales manager, has been made assistant general manager of sales of the new tube department of the Jones & Laughlin Steel Co., Pittsburgh. The new tube works of the company is expected to be in operation about Aug. 1.

A. E. Crockett, formerly vice president of the Standard Chain Co., Pittsburgh, has been made the head of the chain department of the Jones & Laughlin Steel Co., as assistant general sales manager of the chain department.

David N. Barker, who has been the manager of the Chicago branch of the Jones & Laughlin Stel Co., resigned July 1, and has been succeeded by S. E. Hackett, formerly assistant to the president of Joseph T. Ryerson & Sons. Mr. Barker was one of the veteran members of the Jones & Laughlin organization, having been in its employ for 41 years.

Big Interests Buoy Tool Market

Heavy Purchases by Midvale and General Electric Bring Volume of Business for June Up to Fair Proportions—Foreign Business Improves

THE volume of business in the machine tool market during June showed a tendency to shrink.. Large transactions were fewer than in preceding months and small orders also were less abundant. The business closed, however, was of such proportions that in any normal period it would be considered large. One reason for the slowing up in June, undoubtedly, is the high level of prices which now prevail on raw materials. Of numerous shell contracts, for instance, which were offered to domestic concerns, only a few were accepted. This was due to the fact that many of the concerns figuring on such contracts were unable to secure material at prices which would have netted a reasonable profit. Although there was considerable inquiry for shell-making equipment, including presses, large lathes, etc., comparatively few purchases resulted.

Domestic Buying Is Heavy

Included in the important business of the month was that placed by the Midvale Steel & Ordnance Co. This concern supplemented its purchases of May and it now is estimated that altogether it closed for at least $500,000 worth of equipment, including large lathes, planers, profilers and like machines. Another large purchaser was the General Electric Co., which bought heavily for its plants in Schenectady, N. Y., Erie, Pa., and Lynn, Mass. It also bought a large amount of equipment for its subsidiary, the Fort Wayne Electric Works, Fort Wayne, Ind. Among the tools purchased by the General Electric Co. was a large number of hand-screw machines and other equipment which it is believed will be devoted to the manufacture of nose pieces, time fuses or other war materials. This company also placed orders for nine boring mills ranging from 4 to 12 feet. Demand for equipment for making time fuses continued active in June. One of the large purchasers of such machinery was the Keystone Watch Case Co., Riverside, N. J. Another large buyer was the American Locomotive Co., which, toward the end of the month, bought about $100,000 worth of equipment.

Export business, although not nearly as large as during most of last year, showed an improvement over May. Large orders were placed for shipment to Russia, Italy, Spain, France and England. The requirements of these countries involved the general run of machine tools, and particularly tools for use in ship building. In addition to these countries, business came from other foreign sources; for instance, a good order for repair-shop equipment came from Honolulu. Business of a similar character came from Cuba. Small inquiries came into this market from Japan. The largest portion of the foreign business was placed by representatives of Russian concerns. Several of these concerns, it is understood, now practically have retired from the market. The Russian government during the month instituted new methods of regulating imports of machine tools into Russia.

Railroad Buying Slumps

Demand from the railroads during the month was comparatively inactive. The most extensive business was placed by the Chicago & Northwestern and the Michigan Central. The Baltimore & Ohio, the Union Pacific, the Rock Island, the Chicago, Milwaukee & St. Paul and a few other roads placed fair-sized requirements. The Chesapeake & Ohio and the Big Four are expected shortly to close on lists recently issued. Several railroads have large requirements pending on which action has been delayed. One of these is the Grand Trunk which recently took bids at Montreal on 41 large units. It is considered likely this road will issue a superseding inquiry at a later date. The Southern Pacific postponed action on a large list of requirements due to lack of appropriations. The Norfolk & Western placed an order for two 100-ton cranes. A number of eastern roads put out important crane inquiries during the month.

Considerable additional business came from shipbuilding concerns, notably those on the Atlantic coast. Practically all ship builders placed small orders during the month and some of the newer concerns closed large transactions. One of these, the Sun Ship Building Co., Philadelphia, which is building a large plant at Chester, Pa., closed a huge order for punching and shearing machinery. This concern also took prices on its general machine tool equipment and already has placed orders for some of the latter. The Pennsylvania Ship Building Co., Philadelphia, which is building a plant at Gloucester, N. J., also closed for considerable equipment. A feature of the month was the brisk inquiry received from vocational schools. The largest transaction of this character was for a vocational school which is being presented to the village of Chazy, N. Y. This school, which is to be known as the Central rural school, will cost about $500,000 and considerable additional equipment is yet to be placed. The tool requirements were filled for a vocational training school at West Orange, N. J., and also for another at Plainfield, N. J. Bids also were taken for equipment to be installed at other eastern schools.

Labor Troubles Are Minimized

Strikes were a much less important factor in most sections of the country. In New England and in the Pittsburgh district, labor troubles were practically negligible. In Cincinnati, the manufacturers reported that they again were operating on full schedule and that just as many men were employed as prior to May 1, when the original strike of machinists was renewed. The only serious strike of the month developed in the Newark, N. J., district, where the manufacturers organized themselves as a branch of the National Metal Trades Association in order to prevent a united front. Union officials say that about 7,000 men are on strike at Newark but the employers claim that the number of men out is no larger than 1,200. While the country as a whole was less troubled by labor during June, much complaint continued to be heard in reference to the shortage of skilled artisans. Interest as to government requirements in case of a war with Mexico was a feature. So far, however, the Mexican situation has not influenced the machine tool market.

THE OPEN HEARTH

Interesting Points About High Prices

A STUDY of the relation of high prices to production at the present time brings out some very interesting features. The sparring between manufacturers of agricultural implements and the steel bar sellers is a feature of the market every year, but presents some unusual factors this year. Contracts for last half of this year were made for considerable tonnage in the Chicago district at 1.90c, Pittsburgh, but throughout the central west the usual contract price was 2.25c, while for the first half of next year the price named by the mills is 2.50c. This 2.50c price, which compares with 1.20c as the prevailing price a year ago, has not appealed to the agricultural people, who insist that they should have a lower quotation. The mills, however, can point to the fact that with the tremendous demand prevailing for bars for munitions and other purposes, they have no cause to worry if the agricultural implement manufacturers do not place any orders. The mills are not at all alarmed by the fact that new buying and also specifying against contracts are lighter now than for some time and makers are confident they will have no trouble in disposing of all their product. Prices of agricultural implements have been advanced twice since the first of January, one advance of 10 per cent being made the first of February and another 10 per cent the first of May. It is expected that there will be another advance before fall contracting begins, provided the prices of steels and other materials are maintained at the present level. These advances are having the effect of checking the buying of implements and some observers state that many farmers are getting along with their old tools, while many are investing in automobiles. Unfortunately the implement manufacturers do not make public the prices which they obtain for their products as freely as do the steelmakers and the actual prices on some machines are not generally known. The outcome of the controversy between steelmakers and the agricultural implement manufacturers is in doubt, but it seems probable that the 2.50c price will prevail.

The difficulty in taking contracts for forgings is illustrated by the case of a concern which has been trying to arrange to take a contract for export. The price specified on the shell contract, which involves 6-inch shell forgings, was $7.65 per forging at the plant. Each forging, on the average, requires 154 pounds of steel, including an allowance for necessary wastage. The value of the steel per forging at 4c per pound would figure out $6.16, leaving $1.49 to cover the manufacturing costs and the profit. The value of the steel per forging at 4.25c per pound would figure out $6.43, leaving $1.22 to cover manufacturing cost and profit. In order to realize a fair profit, the forging company would be compelled to buy the steel at 3.25c or less, and at last accounts it had not been able to do this. The making of money by the manufacture of war materials is not as easy as some people imagine it to be.

Our New York market report stated last week that high prices are causing leading railroad systems to postpone action on large quantities of track bolts and other track fastenings for 1917 delivery because quotations on some of these products have increased 100 per cent as compared with the corresponding date a year ago. But manufacturers of these materials state that the demand continues strong and that in some cases it has been necessary to quote higher than the regular price in order to stop further buying. Under such conditions, the railroads can hardly complain that the manufacturers are asking more than conditions justify.

Consumption, undoubtedly, is being checked by high prices, but if premiums continue to be eliminated and deliveries improve, conditions will be more nearly normal and consumers will have very little, if anything, about which to complain.

Machine Tool Buyers Less Eager

THE demand for machine tools, as reported in this and previous issues of *The Iron Trade Review*, is tending to diminish. Unusually large transactions are becoming more and more exceptional and the volume of small orders also is shrinking perceptibly. So far, however, the trade has not felt the effect of the reduced demand, since the buying wave which set in a few months after the war broke out has maintained its momentum to such a remarkable degree that, despite the unprecedented manner in which production has been pushed, practically all kinds of machine tools still are sold far ahead. In the case of such tools as have been most in demand of late, the deliveries available run from several months to a year ahead. Practically the only tools which now are plentiful are the medium sized lathes. Originally the latter were the tools most called for in connection with the manufacture of war supplies, but, since the demand shifted to large-diameter shells, the larger sizes of lathes have been most needed. As a result, a good many concerns who embarked into the manufacture of medium size lathes now find themselves with fully equipped lathe departments for which they cannot find work.

How long it will be before the sold-up condition which still characterizes most lines of machine tools will disappear, naturally is a question which the makers are asking themselves. The answer to this ques-

THE OPEN HEARTH

tion depends in large measure upon the prices which from now on will prevail on raw materials and, particularly on steel. The high prices which are asked for steel have had the effect of strangling a large amount of business. A peculiar feature of this development is that even war material contracts, which originally gave the impetus to the steel market, now are being refused on account of the inability to get steel at prices which would prove profitable. Many new shell contracts, for instance, have been offered here by belligerent governments during the past few weeks, but only a few were placed owing to the fact that most of the concerns which negotiated were unable to get steel at a price which would have allowed them sufficient margin to cover manufacturing costs, not to speak of an allowance for profit. As a result, prospective machinery purchases by these concerns have dropped out of the market.

A factor which may have another bearing on this question is the situation with reference to Mexico. It is understood the government already has placed some large contracts for war materials in this connection. Several machine tool sellers, however, believe that unless orders for war munitions for use in Mexico materialize on a large scale, it is unlikely that the machine tool market will experience any far-reaching effect, since manufacturers of arms and other war supplies in this country are fully equipped.

Effects of a Decision

IT IS yet too early to tell whether Pacific coast shippers will attempt to resist in the courts the recent decision of the interstate commerce commission, authorizing and requiring transcontinental carriers to increase iron and steel rates so as to equalize these rates with those applying to intermountain territory. The order of the commission becomes effective on Sept. 1.

Rate attorneys are much interested in one part of the commission's opinion, permitting the increases, because it relates to construing the meaning of a part of the fourth section of the interstate commerce act, which heretofore has not been called in question. Section 4, which is the long and short haul clause, provides that after a carrier has reduced its rates to terminal points, so as to meet water competition, such reduced rates shall not be raised unless the proposal to increase them "rests upon changed conditions other than the elimination of water competition." The commission held that this meant that, in order for the provision to apply, the "elimination" of water competition must be the result of the carriers' own conduct in establishing low rates to water competitive points, putting the water carriers out of business; but where the water competition disappears through other causes, such as the opportunity, which is now being grasped, of the boat lines to make more money by engaging in other traffic, then the carriers may increase their competitive rail rates, when that competition is eliminated in that way.

The Pacific coast cities, however, contended before the commission that the act applied, no matter what may be the reason for the "elimination" of the water competition. Their position was that, whenever the railroads established low rates solely for the purpose of meeting competition, then there must be some other reason for advancing such low rates than the mere fact that the water lines temporarily choose to engage in more profitable traffic available to them. This is purely a question of law, and there is considerable speculation as to whether the Pacific coast cities will abide by the commission's decision, or attempt to enjoin the increased rates on the ground of their illegality under the restriction contained in the fourth section.

So far as concerns the producers of iron and steel in the east their interest seems to lie only in the fact of increased rates from the entire producing territory, inasmuch as the differentials are maintained. That is to say, for instance, the old Chicago rate of 65c per 100 pounds is to be restored, and the prevailing rate of 55c will disappear, and at the same time the present Pittsburgh rate of 65c will be restored to the previous rate of 75c. Thus, the differential of 10c between the two points will continue in effect. In the event, however, that the Pacific coast cities should attempt to enjoin the advanced rates to the coast, the different producers would have a joint interest in the proceeding to the extent of the possibility that the court might sustain its power to prevent the increases from all the producing points.

There has been a common impression, gained from published reports, that the decision will give intermediate points as low rates from the east as the coast terminals will receive. This is not correct. The decision restores the case to the precise status it was given by the commission's original order of about five years ago. By this order, rates intermediate between the Missouri river and the Pacific coast were made no higher than those to the coast; rates from the Mississippi river, Chicago and Birmingham, Ala., to intermediate points were allowed to be no more than 7½ per cent higher than those to the Pacific coast; rates from the Buffalo-Pittsburgh territory to intermediate points were allowed to be no more than 15 per cent higher than those to the Pacific coast; and rates from the Atlantic seaboard to intermediate points were allowed to be no higher than 25 per cent than those to the Pacific coast.

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products July 5, average for June, 1916, average for April, 1916, and average for July, 1915. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices July 5, 1916.	Aver. for June, 1916.	Average for Apr., 1916.	Aver. for July, 1915.
Bessemer pig iron, Pittsburgh	$21.95	$21.95	$21.95	$14.88
Basic pig iron, Pittsburgh	18.95	18.95	19.20	13.83
No. 2 Fdy. pig iron, Pittsburgh	19.45	19.45	19.45	13.60
Northern No. 2 Fdy., Chgo.	19.00	19.00	19.00	13.00
Lake Superior Charcoal, Chgo.	19.75	19.75	19.75	15.75
Mall. Bess., Chgo.	19.50	19.50	19.50	13.00
Southern No. 2, Birmingham	14.00	14.15	15.00	9.62
Southern Ohio No. 2, Ironton	18.00	18.46	18.50	12.60
Basic, eastern Pa.	19.00	19.25	20.50	13.75
No. 2X Virginia furnace	18.50	18.00	18.50	12.50
No. 2X foundry, Philadelphia	20.00	20.00	20.75	14.50
Ferro mang., Balti., (1917)	175.00	175.00	175.00	103.00
Bessemer billets, Pbgh.	40.00	41.20	45.00	21.40
Bess. sheet bars, Pbgh.	40.00	41.20	45.00	21.70
Op.-h'th sh. bars, Pbgh.	40.00	41.20	45.00	22.00
Open-hearth billets, Pbgh.	40.00	41.20	45.00	21.50
Steel bars, Chgo.	3.10	2.69	2.64	1.46
Steel bars, Pittsburgh, contr.	2.50	2.50	2.50	1.26
Iron bars, Philadelphia	2.559	2.559	2.559	1.25
Iron bars, Cleveland, local del'y.	2.40	2.40	2.40	1.20
Iron bars, Chgo. mill	$2.35	$2.35	$2.35	$1.20
Beams, Chgo.	3.10	2.69	2.64	1.46
Beams, Pittsburgh, contr.	2.50	2.50	2.50	1.26
Beams, Philadelphia	2.659	2.659	2.659	1.35
Tank plates, Pbgh., contract	2.90	2.75	2.67	1.22
Tank plates, Chicago	3.50	3.09	2.94	1.39
Tank plates, Philadelphia	3.909	3.909	3.909	1.35
Sheets, blk., No. 28, Pbgh.	3.00	2.92	2.91	1.77
Sheets, blue an., No. 10, Pbgh.	3.25	3.10	3.00	1.35
Sheets, galv., No. 28, Pbgh.	4.50	4.79	4.89	4.55
Wire nails, Pittsburgh	2.50	2.50	2.40	1.59
Connellsville fur. coke, contr.	2.50	2.63	2.98	1.75
Connellsville fdy. coke, contr.	3.25	3.50	3.50	2.25
Heavy melting steel, Pbgh.	15.50	16.25	18.12	13.38
Heavy melting steel, east'n Pa.	15.00	15.75	17.75	12.00
Heavy melting steel, Chgo.	14.00	15.35	16.75	10.15
No. 1 wrought eastern Pa.	19.75	20.75	23.00	13.50
No. 1 wrought, Chgo.	15.00	15.35	16.80	8.90
Rerolling rails, Chgo.	15.75	16.25	17.90	10.10
Car wheels, Chgo.	12.50	12.50	14.00	10.30

(For Additional Prices See Page 54.)

High Prices for Steel Making Pig

Are Expected in the East and Some Furnaces Are Conserving Their Iron While Awaiting Developments

Philadelphia, July 3. — A belief that higher prices in steel-making grades of iron will result from the active foreign demand is growing with eastern Pennsylvania makers as the export inquiry continues in round tonnage. Several additional sales of smaller tonnages have been made to Italy by eastern producers in this district and the pending foreign inquiry is heavy, aggregating easily 15,000 to 20,000 tons. There is much demand for special bessemer running 0.04 to 0.05 in phosphorus. Low phosphorus metal also is being negotiated for freely and standard iron for export has sold the past week at $35, eastern furnace. Domestic users of low phosphorus also are inquiring more freely and eastern makers have taken measures to measure their 3,000 tons. This grade is a trifle stronger output. Sales of the week were 2,000 to in price. From the viewpoint of home consumption, the market is dull and quite uneventful. Small sales are the market's chief activity. Shading of prices is general. A Lebanon, Pa., steel maker has inquired for 4,500 tons of basic for third quarter. This grade is quoted around $19, delivered eastern Pennsylvania. Foundry iron covers a range of $19 to $20, eastern Pennsylvania furnace, for No. 2X and small sales are being made at both points of this spread. No. 2 plain iron has been far under the $19 price. Virginia furnace prices are unchanged at $18.50, furnace, for No. 2X, but resale metal is offered 50 cents to $1 less. Lake ore deliveries to certain eastern Pennsylvania furnaces are falling behind schedule with the result that some of the consumers are following the situation very closely. One interest has decided to offer no more basic iron at present in view of ore conditions.

Foreign Demand is Strong

New York, July 3.—Closing of several additional sales of round tonnages of bessemer iron for export during the past few days illustrates the importance and possibilities of the current foreign demand which is as active as ever. One European country other than Italy has been a heavy buyer, taking this week at least 20,000 to 25,000 tons of bessemer for shipment during the third quarter. This iron will come largely from the valleys and was purchased on the basis of $23.64 and higher at New York, or $21.50 at the furnace. Further tonnage for this buyer is under negotiation. Italy has continued an active buyer and has been taking some foundry iron from the south on the basis of $14, Birmingham for Alabama No. 2 foundry or No. 2 soft or $15.40, New Orleans and $15.50, Savannah. A sale of 1,000 tons was made this week at this figure and another recent lot closed was 2,000 tons. Pending inquiries for southern foundry for Italy total about 5,000 tons, including one of 1,500 tons. Italy continues to negotiate for various lots of steel-making iron. There is more demand for foundry iron for export generally in the market. England wants 10,000 tons of a foundry grade analyzing about 2.50 in silicon and 1.60 in phosphorus, as well as 5,000 tons of bessemer. Australia is a possible buyer of high silicon foundry. France, as stated a week ago, has been buying more actively, especially of steel-making grades. The heavy call for freight room to Italy and southern France has reduced current offerings. A rate of $30 per ton is more difficult to obtain. The domestic market shows no life. The Gould Coupler Co., Depew, N. Y., which recently inquired for 5,000 to 10,000 tons of basic for last half, has closed for some tonnage, but remains in the market for 5,000 tons for last quarter. A Westfield, Mass., buyer is out for 1,000 tons of low silicon for third quarter. Northern and Virginia resale iron continues to be offered at concessions and furnace prices are soft.

Pig Iron Inactive

Pittsburgh, July 3.—W. P. Snyder & Co. announce that the average price of

(*For complete prices see page* 54.)

bessemer and basic pig iron in June was $21 and $18, valley, respectively. Averages are based upon actual sales of 1,000 tons or more to domestic consumers. Compared with averages for the preceding month, bessemer iron in June advanced $0.167 and basic iron declined $0.1607. Compared with averages established in the corresponding month of 1915, bessemer pig iron advanced $7.25 and basic pig iron advanced $5.176 per ton last month. The average price of bessemer iron in June of this year was the highest recorded since October, 1907.

The general pig iron market continues quiet. So far as is known, the Colonial Steel Co. has not yet closed on its inquiry for 10,000 tons of basic iron for shipment the last four months of this year and the first month of next year. A manufacturer of sanitary ware is in the market for 1,000 tons of No. 1 foundry iron. No. 2 foundry iron is being held at $18.50, valley. A valley interest has sold about 20,000 tons of bessemer pig iron for export, obtaining $21.50, furnace, for some of the tonnage involved.

Arbitrary Rejections

Cleveland, July 3.—Decided dullness in pig iron continues. Inquiries from foreign countries are receiving little attention, partly on account of the difficulty of giving delivery in time, and also on account of the severity of requirements as to analysis and the disposition to reject in a rather arbitrary manner when iron does not conform exactly to specifications. The totol sales of leading firms for the past month were very small compared with preceding months.

Some Interest at Chicago

Chicago, July 4.—While no alteration has taken place in quotations on northern malleable and foundry pig iron. Lake Superior charcoal or Jackson county silveries, some interest is being manifested by consumers in regard to their necessities late in the present year and during first half of 1917.

This interest seems to arise from fear that present labor difficulties in the ore regions of the northwest may shorten the supply of ore and reduce production of pig iron before navigation opens next spring.

Apparently considerable tonnages of pig iron produced in this country are being sold for export, although nothing of this sort has been taken on by stacks in the west.

Iroquois Iron Co. will blow in its D stack early this month, after having been out for relining. This will give Iroquois three stacks active on ordinary grades of pig iron, in addition to the one stack now operating on ferro-alloys.

Southern pig iron continues nominal and weak. Practically nothing is being sold in this territory by southern makers and it is difficult to determine the range of prices although $14 to $14.50, Birmingham, seems to cover the situation.

Quiet at Cincinnati

Cincinnati, July 3.—Local dealers have made a few sales to melters in adjoining districts, but demand in this immediate territory is at a positive standstill. A central Illinois user has purchased 1,000 tons of southern Ohio malleable iron, and a central Ohio manufacturer has taken 500 tons of charcoal iron, both for the last half of this year. Prices on resale iron from the south are uncertain, as holders of this grade, in a number of cases, are anxious to sell, and are making attractive quotations. A few sales have been made at $14, Birmingham basis, for No. 2 foundry, for spot or last half shipment. Occasional small lots of furnace iron are being sold at $14 for prompt delivery, but the usual price asked by furnaces is from $14.50 to $15, Birmingham basis, for 1916, and the first half of 1917. Southern Ohio stacks, which are running largely on basic iron, are holding both No. 2 foundry and basic at $19, Ironton basis, for this year and the first half of next year. Resale iron from that district is quoted from $18 to $18.50, for 1916 shipment. Southern silvery iron is being offered from $24 to $25, furnace, for 8 per cent silicon, for the last half of this year. This same grade from southern Ohio is being held at $27, furnace, for the same delivery.

Heavy Inquiry

Birmingham, Ala., July 3.—For the past month, the southern pig iron situation has been restive. During this time inquiries have been comparatively light and sales have been few and for small lots. However, the past week brought forth heavy inquiries, and this fact has been reported by all the large producing interests of the district. While the tonnage closed for during the week, as a result of these inquiries, was small, and for small lots, some round lots are now pending—for iron for shipment in this country and abroad. France has made inquiry for foundry iron to substitute for Middlesboro. Some shipments were also made to Italy and Norway, and some Holland inquiries have shown up. Warrant iron is still a controlling factor in the southern market. Quotations of warrant iron have been heard of as low as $13.25 per ton at the furnace—or $1.75 per ton below Birmingham spot iron. The disturbing feature is the fact that the warrant price obtains for shipment through the rest of the year, whereas the producing interests are asking $15.50 for last half shipments. It is not unlikely that $15 per ton at the furnace could be obtained under present existing conditions. All indications point to the fact that there is not likely to be a change in conditions before Sept. 1, at which time a stable base price is looked for.

In Warrant Market

New York, July 3.—A development, apparently of some importance in the market for southern pig iron warrants, is the appearance of some inquiry for futures. The market has been bare of any interest of buyers in future warrants for a number of weeks. Some tonnage now is being sought for third quarter. There also is better inquiry for spot warrants. Probably 10,000 tons of inquiry for both spot and futures now are pending. Some tonnage in spot warrants continues to be available at $13, at the warehouse in the Birmingham district for Alabama No. 2 foundry and further business has been closed at this figure. Holders of spot warrants, generally, however, fix $13.25 as their minimum price. The spot warrant market is quotable at from $13 to $13.25 at the storage yard in the Birmingham district for No. 2 southern iron.

(For complete prices see page 54.)

Pipe Prices

Have Not Changed, But Card is Issued for Kentucky Points

Pittsburgh, July 3.—The National Tube Co., under date of July 1, sent out cards showing prices on oil country goods for shipment to points in Illinois and Kentucky, carrying freight rates of from 26 cents to 35 cents per 100 pounds. Briefly, the card is issued to establish prices on casing, tubing, drive and line pipe for shipment to the Irving field of Kentucky, which recently was developed Prices of oil country goods and standard pipe have not been changed recently.

Some manufacturers of tubular goods are refusing to accept additional orders at prevailing prices. Steel boiler tubes, in some instances, are being quoted at four points below the quotations adopted April 15. A reduction of one point is equivalent to an advance of about $2 a ton.

The Moltrup Steel Products Co., Beaver Falls, Pa., is erecting an addition for the manufacture of cold drawn steel bars and milled specialties.

Bar Demand is Heavy

And Manufacturers Are Not Worried by Refusal of Implement Men to Contract at 2.50c

Pittsburgh, July 3. — Demand for rounds continues so heavy that manufacturers do not appear greatly interested in inquiries from agricultural implement makers, who have been trying to cover requirements for the second half of this year at less than 2.50c, the prevailing price. No indication of that figure being shaded can be found. Demand for rounds for the manufacture of war material for entente nations continues extremely heavy and it is likely that the United States government soon will purchase large quantities of shells and munitions to supply men taking part in the Mexican campaign with equipment. A number of large inquiries for munitions are understood to be pending. The 2.50c figure for future delivery is being firmly maintained, although at least one mill is accepting orders at that figure for rather prompt shipment.

No Cancellations Last Quarter

Philadelphia, July 3.—An absence of cancellations characterized the conclusion of specifications against second quarter contracts in this territory July 1. The reason for this is clear since most of these commitments were on a basis of about 1.60c, Pittsburgh, as against 2.50c, Pittsburgh, the current market. Many of these contracts in the third quarter will move up sharply $13 to $18 per ton, or to 2.25c to 2.50c, Pittsburgh, per pound, and it remains an open question whether the tonnage for the next three months will be taken out cleanly by buyers. Bessemer bars for early and last half delivery continue to be offered by certain makers at 2.50c, Pittsburgh. In some cases, orders for shipment in two to three weeks have been accepted on this basis of price.

Steel Bars Firm

Chicago, July 4.—With important producers of soft steel bars entirely sold for the remainder of the present year, new business is somewhat slack for this form of finished steel. Small tonnages are being booked for delivery during first half of 1917, but most domestic buyers are not anxious to cover their requirements at present for such remote delivery.

Export demand is heavy and considerable material is being booked for next year's delivery to go abroad.

Hard steel bars re-rolled from rails continue firm at 2.50c, Chicago mill, for delivery at convenience and an occasional tonnage for immediate delivery is commanding a higher figure.

Heavy Specifying

Cleveland, July 3.—The demand for steel bars from automobile concerns is very strong and specifications are coming in freely. Agricultural implement manufacturers are not contracting at the 2.50c price offered by the mills for the first half of next year. Bands are in strong demand and mills are so sold up that leading interests cannot promise delivery in less than eight to nine months. The demand for rerolled material is only fairly active and quotations now range from 2.50 to 2.75c, compared with 2.95c made recently by some makers.

Bar Iron Steady

Chicago, July 4.—Makers of iron bars find business somewhat brisker than was the case during the past few weeks and a fair inquiry is present in the market. Mills in this district now are booked about equal to three months' output and if new business is booked at approximately half the rate of shipment, this will care for their rolling schedules until the first of next year.

The price continues firm at 2.35c, Chicago mill, without tendency on the part of any to shade. For fourth quarter business 2.50c is being asked, but buying is light for that delivery.

Hoops, Bands and Cotton Ties

Pittsburgh, July 3.—The Carnegie Steel Co. and the Pittsburgh Steel Co. are shipping heavy tonnages of cotton ties to the south. Government reports issued today indicated that the cotton crop this year will involve 14,000,000 bales. Cotton ties are being held at $1.35 a bundle of 45 pounds, July basis.

Specifications for hoops and bands are heavy, but scarcely any new business is reported. This is not surprising, in view of the fact that consumers have covered requirements for the remainder of the year. Steel hoops are being held at 2.75c and bands at 2.50c.

Tunnel Planned.—The North Terminal Underground Railroad Co. of New York has been incorporated at Albany by J. M. Fisk, G. Russel, L. C. Ferguson, O. P. Pell and H. I. Skelton. It is understood that the construction of a tunnel under the Hudson river from the Battery in New York City, to Communipaw, N. J., is being projected by this company. There are reports that several eastern railroads are interested in the proposition.

Billets Strong

Buyers Fail to Buy at $45, Youngstown, for Prompt Delivery

Youngstown, O., July 3.—The market for semi-finished materials is strong. One lot of sheet bars, involving 500 tons, was sold this week at $40 for third quarter delivery. Buyers have made overtures to several mills to contract for billets for prompt delivery at $45, but no sales resulted. Mills are so well fortified on future business that sales are necessarily infrequent.

Demand Heavier

Pittsburgh, July 3.—Demand for semi-finished material has been heavier than previously the last week or ten days. Manufacturers of munitions have been active factors in the market for billets, and sales of sheet bars involve heavy tonnages in the aggregate. Acccrding to some people in close touch with the situation, neither billets nor sheet bars are available at less than $42, mill, although reports of sales at $40, mill, still are heard. Consumers of sheet bars now are paying from $5 to $7.50 a ton above prices prevailing during the second quarter of this year and the increase in cost partly is responsible for the improved tone of the market for finished products. Manufacturers are not offering wire rods, and no sales of muck bar have been made in the open market recently.

Electric Ingots Sold Abroad

Philadelphia, July 3.—Foreign buyers are keeping up an active demand for steel in semi-finished form. A sale of 1,000 tons of electric steel in ingot form has been made to Italy by southern producers through middlemen in this city. Special prices were obtained. Both Italy and the British Isles are in the market for further good tonnages. A new inquiry from Glasgow calls for 2,000 tons of sheet bars. There are some good-sized lots in the domestic market. A Lebanon valley mill is out for 1,500 tons of small open-hearth billets for third quarter delivery. Makers report further sales of bessemer billets for quick shipment at $47, western Pennsylvania mill. Eastern makers of open-hearth billets still ask $50, mill, for rerolling, and $65, mill, for forging quality.

(*For complete prices see page* 54.)

Many Sheet Mills Closed

For Fourth of July Holidays and Taking of Stocks— Hot Weather Expected to Affect Production

Youngstown, O., July 3.—Production of sheets in this district is practically at a standstill, as most of the mills were shut down last Friday at midnight. In some instances they will resume Wednesday, while others will take this opportunity to make repairs and will not start up until the first of next week. Several mills will not roll sheets for several weeks, as they will make a thorough inventory, the first time in several years that they have taken account of their stocks. Stocks generally are low, one mill having practically cleaned out the stock of 14,000 tons that was on its warehouse floor 18 months ago, while another has disposed of most of its stock of 12,000 tons.

Sheet mill owners here expect a still further restriction on output even after resumption, as the advent of hot weather will operate to reduce the output. While sheet production for some months has been maintained at a high rate, and in some cases at a record-breaking one, mill managers here point out that the individual output per workman has shown no appreciable increase. In line with other industries, the demand for labor has resulted in lessening the quality of the working force and production has suffered correspondingly. Hot weather always brings with it a decrease in output, and this condition is expected to hold true this year.

Buying has been almost dormant for some days, but without any attendant weakness in prices. As pointed out previously, this lull is largely seasonal, and after the consumers have completed their July 1 inventories, a renewal of buying is expected. Sheet producers predict that when buyers re-enter the market, they will encounter a greater reluctance by the mills to make price concessions. The explanation for this feeling is found largely in the fact that the cost of both labor and sheet bars advanced on July 1.

While mounting costs lend somewhat greater firmness to the market for black and for blue annealed sheets, the weakness of spelter has more than offset this tendency in the case of galvanized sheets. The generally accepted minimum for this grade continues to be 4.50c, and some makers are pushing sales at that figure. Some business has been closed this week at 4.40c, while at the same time other mills are still quoting 5c. Falling spelter prices, however, have not yet tempted several makers to resume operations in their galvanizing departments.

Most mills are in a comfortable position relative to blue annealed bookings, and have orders sufficient to insure capacity operations for some weeks, and in several cases for three months. This grade continues very firm at 3.25c for No. 10 gage. Black sheets continue to move at 3c for No. 28 gage, without the 2.90c minimum having disappeared. The volume of light sheet business is comparatively small, as decreased supplies of sheet bars, coupled with more attractive prices, have caused some mills to concentrate their activities on gages heavier than No. 16.

Galvanized Are Weaker

Chicago, July 4.—Galvanized sheets are now selling as low as 4.50c, Chicago, but there is comparatively little buying. Consumers who have any stock are waiting in the hope that spelter may decline still further. Warehouses with considerable stock of galvanized are said to be making attractive prices rather than run the risk of being left with costly material on the falling market.

Sheets Firm, But Quiet

Pittsburgh, July 3.—Specifications on old contracts are heavy, but scarcely any new buying of importance is enjoyed. Small lots of galvanized sheets have been sold at as low as 4.50c, but some mills continue to ask 5c for 28 gage, at which figure a couple of carloads were sold a few days ago.

English Makers of Ferro

Are Resisting the Growing Competition of Domestic Makers Who Are Getting Good Results

New York, July 3.—English makers of ferro-manganese apparently are resisting more energetically the increased competition by domestic manufacturers for the trade of American consumers which before the war largely was supplied from abroad. The English producers who had been offering little metal for early shipment and had been holding for $175 to $200, seaboard, for forward shipment, including 1917, now are offering lower prices, especially for nearby delivery. As intimated a week ago, $200, seaboard, for spot English now can be done and one instance is reported where July metal was offered on the basis of about $175, seaboard. For last half, $175, seaboard, is quoted on English against $200, seaboard, a short time ago. As recently noted, it has been understood that at least one seller will shade $175 for 1917 shipment by a few dollars to desirable customers. Domestic makers have been quoting $225, furnace, for spot and nearby and $175 for forward shipment.

A development of significance which probably is related to the easier condition of the early market is the fact that some English makers are anticipating their deliveries on contracts with consumers in this country. This is not true of all makers, however. In some instances, this has been done at the request of the buyers. This is a rather radical change from the situation as it existed only a short time back, when shipments were in arrears and buyers were in serious doubt whether they would be able to get their metal as they needed it.

Close observers of the ferro-alloys market have been saying right along that when the domestic competition in ferro-manganese became formidable, the English furnaces could be expected to make price concessions. Domestic makers have been showing much proficiency in the manufacture of both ferro-manganese and spiegeleisen and have demonstrated that if the ore is available on a comparable basis, they can produce these metals to advantage. Some of the domestic ferro-manganese lately made has analyzed 82 per cent in manganese against 80 per cent in the standard English metal.

Several thousand tons of new export inquiry for speigeleisen are pending. Prices are unchanged at $50 to $55, furnace, for 20 per cent.

Indian manganese ore for late-year delivery is being offered at 79 cents per unit at tidewater. Buyers are inclined to regard this price as too high.

Government Buys

The government was the buyer of 15,000 tons for Brooklyn and 10,000 tons for Panama of lump ferro-manganese packed in barrel for which it paid about $205 to $210 seaboard. Domestic metal was furnished.

(For complete prices see page 54.)

New Buildings Are Few

And Business Consists Principally of Small Orders—

Subway Sections Soon to be Placed in New York

New York, July 3.—Small orders continue the chief activity in new structural business in this territory and buyers are slow to act on large propositions except those wherein urgent delivery is required, such as extension to munition works. It is reported that a Brooklyn munition manufacturer quietly has closed for further extensions requiring several thousand tons. Several additional subway sections are being placed in the form for award following the recent rejection by the city of the blanket bids on the steel. A 15,000 to 16,000-ton section in Brooklyn is to be readvertised. The steel for a 4,000-ton Manhattan section, on which the award of the general contract was made some weeks ago, has been placed with leading fabricators. The steel for two other sections involving about 7,000 tons still is pending. The American Bridge Co. has been fitting up its Trenton, N. J., plant as a boat yard, and now is building a number of river and harbor craft, including seven car floats for the Lehigh valley railroad which were awarded some time ago. Plain material prices are quoted at from 2.50c to 2.75c, Pittsburgh, or 2.669c to 2.919c, New York.

Take Out Full Contract

Philadelphia, July 3.—In practically all instances structural shape buyers in this country have taken out in full the tonnage set aside for them under second quarter or first half contracts now expired. Most of these contracts with eastern Pennsylvania makers were on a basis of 2c, Pittsburgh. Prices on running contracts for the quarter now started are at 2.50c, Pittsburgh, or $10 per ton higher. Recent selling of early shapes, especially bessemer at 2.50c, Pittsburgh, or 2.659c, Philadelphia, seems to have passed and the most active sellers now are holding around 2.75c. Nothing much is heard of 3c, Pittsburgh, prices at present. New business rules very quiet. No action yet has been taken on the 15,000 to 18,000 tons of shapes asked by Canadian car shops against the large Russian equipment order now pending.

Shapes Continue Active

Chicago, July 4.—After the lull in buying of structural shapes, which marked a portion of June, the revival which appeared late in that month continues. An interesting feature of the market during the past week is the closing of two contracts for commercial buildings in Chicago, each involving about 200 tons of structural steel. Other new lettings were for public and industrial purposes.

Offering of excess stocks of shapes by a number of fabricators in the west and middle west has given the market an appearance of weakness, which it does not possess. While mill deliveries at 2.69c, Chicago, can promise nothing before the early part of 1917, the same price for prompt delivery has been made by fabricators desiring to unload part of their stocks. This has not had the effect of weakening mill prices in any degree.

CONTRACTS AWARDED.

Great Western Sugar Co., two sugar factories, one in Gering, Neb., and one in Colorado, 1,530 tons.

Milford Realty Co., building, Chicago, Ill., 222 tons.

James R. McKay, mercantile building, Chicago, Ill., 200 tons, to Holmes, Pyott & Co.

Terminal building for Northern Ohio Traction & Light Co., Akron, O., 9,000 tons, awarded to the McClintic-Marshall Co. General contract awarded July 1 to Carmichael Co. of Akron.

Seventh avenue subway connection of Pennsylvania railroad station 600 tons to the American Bridge Co.

CONTRACTS PENDING.

Additional bridge work for the Pennsylvania railroad, 400 tons, bids being taken.

Apartment hotel, 103rd street, New York City, 500 tons, bids being taken.

Section of Eastern Parkway subway from Buffalo to New Lots avenues, Brooklyn, 15,700 tons, bids rejected. Will be readvertised. Conners Bros. previous low bidders.

Spot Coke Strong

Many Connellsville Ovens Operating at Half Capacity

Pittsburgh, July 3.—Partial cessation of operations at many plants in the Connellsville regions has strengthened the market for blast furnace and foundry coke for immediate shipment. Many coke plants are operating only at 50 per cent of capacity today and it is probable that most ovens will be banked tomorrow. Some blast furnace fuel for spot shipment was sold today at $2.75, ovens, and it frequently is predicted that coke will command $3, ovens, before the end of the week. Several cokemakers, whose plants were almost totally idle today, were forced to buy fuel in order to fill contracts. No additional contracts for shipment the second half of the year have been placed. It develops that several consumers in eastern Pennsylvania purchased 48-hour fuel for the last six months of the year at as low as $2.35, ovens. The market for foundry coke has been fairly active and prices have declined to $3.15, ovens, for future delivery and $3, ovens, for spot shipment. Some grades of foundry coke have been sold at less than $3, ovens. *The Connellsville Courier,* for the week ending June 24, says production was 417,540 tons, compared with 433,176 tons the week before.

(*For complete prices see page* 54.)

Buying Expected

Cincinnati, July 3.—Coke prices are weaker, but no changes have taken place since last week, when slight declines were noted on Wise county and Pocahontas furnace grades. No demand is out for either furnace or foundry fuel, but makers are of the opinion that a buying movement for furnace coke is about to begin.

Active in South

Birmingham, Ala., July 3.—Foundry and furnace coke are the most active commercial agents in the Birmingham district at the present time, and higher prices obtain today for this commodity than for many years past. The demand is not only heavy, but the supply is exceedingly limited. With the contemplated blowing in of two additional furnace stacks in the district between now and Sept. 1, active preparations have been made to care for coke requirements. One mine and 150 old beehive ovens, which have been idle for the past four years, will shortly be producing coal and coke for one iron interest, and the outside coke supply which formerly was supplied this concern has been contracted for by another iron interest. Prices are firm at $4.25 to $4.50 per ton at the ovens for foundry coke and $3.25 to $3.50 per ton at the furnace for furnace coke.

Cleveland Company Expands

The Crucible Steel Forge Co., Cleveland, is erecting a new factory and office building on a parcel of land owned by the company at E. Seventy-first street, near Grant avenue, on the Belt Line. The factory will be a one story building, 45 x 480 feet. The office structure is of brick, 40 x 40 feet, one floor and basement. A new 2-ton, electric induction furnace will be installed to make high grade carbon and crucible steel. Power for this will be purchased and converted on the grounds. Two coal fired furnaces and six or seven gas fired furnaces will be added to the present equipment at the company's plant.

Plates for the Government

Steel Makers and Shipbuilders Will Have All They Can Do to Meet Uncle Sam's Demands

New York, July 3.—Steelmakers and ship builders are facing a difficult problem to meet the requirements of the government for the extensive new program of naval construction now well-outlined, on an important part of which urgent deliveries are desired. It is estimated by leading steelmakers that the requirements of hull material for the new war craft will be approximately 150,000 tons and this figure will be increased to 200,000 to 225,000 tons by the protective deck and armor plate. Deliveries on this steel, according to the present plans, are to start Jan. 1, 1917. Some of the ship yards are reserving space in their plants in anticipation of the government contracts.

Export Demand Heavy

Philadelphia, July 3.—Export demand for plates continues to represent part of the going business and it is estimated by makers that fully 100,000 tons for foreign buyers are pending. Much of this is for ship yard works, chiefly for Italy, Japan and England. Japan has a single inquiry for 30,000 tons of ship plates before sellers. China is a new figure in the market and this week asked for 1,500 tons of boat material. Domestic requirements also are holding up bravely. One eastern mill was obliged this week to decline an order for 5,000 tons for shipment during the first quarter of 1917 at an attractive price because its output is taken up fully until April of next year by definite orders now on its books. One buyer is seeking 27,000 tons for next year, partly ship work. The leading eastern platemakers are holding for 4c, Pittsburgh, for shipment at their convenience; one maker is doing 3.75c, Pittsburgh, while others occasionally will do less on narrow widths. With the coming of the third quarter, a good many contracts moved up to a 4c, Pittsburgh, or 4.159c, Philadelphia, basis.

Steel For Boats

Cleveland, July 3.—The last two bulk freighters ordered by M. A. Hanna & Co., to be built by the American Ship Building Co., will require about 7,000 tons of plates and will be constructed from steel purchased many months ago from the Carnegie Steel Co. The three boats recently ordered are to be delivered in June, July and August, 1917. The placing of the order for these vessels has aroused much interest in marine circles, as it shows the tremedous demand for vessel tonnage and indicates the determination of leading shippers not to be caught napping in regard to next year's requirements. Local plate mills are quoting 3.50c, Pittsburgh base, on light plates and 4c on heavier plates. Eastern Pennsylvania plate mills are quoting 4.10c and will not promise delivery in less than six months.

High Prices at Pittsburgh

Pittsburgh, July 3.—Specifications for steel plates in June were considerably heavier than shipments, although orders entered for rolling were not so heavy as those received in the preceding month. Some of the mills in eastern Pennsylvania, as previously reported, have received heavy orders for ship plates for shipment to the far east. Manufacturers in this district do not appear anxious to take additional tonnages apparently believing that quotations will advance for delivery after Dec. 31. The 2.75c price, which was being quoted by some makers for shipment at their convenience, has virtually disappeared, no evidence of that figure now being found. The Carnegie Steel Co. and the Jones & Laughlin Steel Co. are asking 2.90c for delivery at their convenience.

Plates Continue Strong

Chicago, July 4.—While mill prices on steel plates continue 3.09c, Chicago mill, without change, this being for delivery some months in advance, prompt delivery material can now be obtained at 3.44c, Chicago, but apparently there is less inquiry for this material even though the premium price for early delivery is much less than was the case a few weeks ago.

An interesting feature of the market is the tonnage which will be necessary for the government in carrying out its naval program for the next five years. A good deal of this is armor plate, but a considerable amount of other steel plates will be needed also and will assist in keeping the market busy when added to probable domestic necessities.

Cast Iron Pipe

New York, July 3.—Eastern pipe foundries are running comfortably on the smaller sizes, but there is a general need of the larger diameters to balance off shop operations. Were it not for the continuance of considerable buying by private consumers, the markets would be inactive as public offerings are very few. Jersey City is in the market for several hundred tons of 6 to 24's, largely 6 and 8's. R. D. Wood & Co. is the low bidder on 400 to 500 tons of 6, 8, 10 and 12's for Panama delivery. The Eastman Kodak Co. still is to act on several thousand tons of iron or steel pipe. Prices are steady and unchanged.

Decreased Orders

Birmingham, July 3.—Water and gas pipe makers again report a slowing up in orders, as has been the case for two to three weeks. At the same time, there is a sufficient aggregate to maintain schedule of operations. The belief is general that the pipe market will be more active after the turn of the year.

(For complete prices see page 54.)

Benzol Prices

Reflect Effects of Demand in Excess of Supply

New York, July 3.—With the demand in excess of the current supply, spot pure benzol continues to strengthen, though prices have not been affected for early shipment. Some selling is being done by certain producers and middlemen and small lots of resale continue to come out. It is stated by sellers that 75 cents per gallon is obtainable. Concessions sometimes are granted by certain interests. Contract benzol shows little activity.

Inquiry for toluol still is increasing, especially for future deliveries. Many of these negotiations remain in a tentative stage and there is not much new business. Early supply of toluol is very limited. Prices are unchanged. A little more demand for solvent naphtha is current, but it has not been sufficient to alter prices or general conditions.

Additional yearly contracts for sulphate of ammonia have been closed during the past week at from $3.25 to $3.35 per 100 pounds at seaboard. There is practically no spot demand from domestic buyers. Several inquiries for export are pending generally from nearby countries such as Cuba.

The current quotations per gallon at the maker's plant on leading coke oven by-products, are as follows:

Pure benzol, spot	$0.70 to .75
Pure benzol, contract	.70
Toluol, spot	4.50 to 4.75
Toluol, contract	4.50
Solvent naphtha, spot	.45 to .50
Solvent naphtha, contract	.40 to .45

Sulphate of ammonia is $3.25 to $3.35 per 100 pounds at tidewater for both spot and contract.

Pig Iron Output Declines in June

Production Last Month Decreases About One and One-Half Per Cent—First Half Output Sets New Record—More Stacks Active

FOR the second time since conditions in the iron and steel industry began to improve 19 months ago, pig iron production shows a decline from the preceding month. The output of coke and anthracite pig iron in June was 3,213,818 tons, compared with 3,364,584 tons in May, a loss of 150,766 tons. January of this year was the only other month to show a loss from the preceding month during the past year and a half of expanding business.

The complete total for the first half of 1916, now available, indicates a production of more than 39,000,000 tons during this year. The total production of pig iron during the first half of 1916 was 19,381,954 tons. The production of charcoal iron will run the year's total over the 39,000,000-ton mark. The production during the last six months easily surpasses that of any other half yearly period. In the last half of 1915 production exceeded 17,525,000 tons, the only other corresponding figure being found in the first half of 1913, when the production reached 16,317,000 tons.

AVERAGE DAILY PRODUCTION.

	1916.	1915.	1914.	1913.	1912.
Jan.	102,319	51,323	60,624	89,929	66,220
Feb.	106,157	59,521	67,450	92,095	72,372
Mar.	107,343	66,009	75,534	89,123	77,791
Apr.	107,517	70,484	75,383	91,812	79,254
May	108,535	72,747	67,646	90,865	80,753
June	107,127	78,998	63,486	87,229	81,125
July	.....	82,687	63,075	82,525	77,502
Aug.	.....	89,510	64,403	81,839	80,650
Sept.	.....	94,478	62,757	83,137	81,482
Oct.	.....	100,656	57,007	81,933	86,569
Nov.	.....	101,174	50,042	74,322	87,985
Dec.	.....	103,278	48,236	63,746	89,590
Av'r'ge	106,494	81,022	62,934	83,980	80,124

The output of non-merchant iron in the first half of this year was 14,011,115 tons. This figure also establishes a new record, surpassing the previous mark of 12,977,000 tons set in the last half of last year. The merchant furnaces produced 5,162,123 tons in the first half of this year, exceeding the previous record made in the first half of 1913, when 4,610,000 tons were produced. The average daily production last month was 107,127 tons compared with 108,535 tons in May, a loss of 1,408 tons. This loss resulted entirely from the decreased output of the steel works furnaces. These stacks in June averaged daily 77,440 tons against 79,127 tons in May, a loss of 1,687 tons. The merchant furnaces showed a slight increase in average daily output, the June figure being 28,145 tons against 28,120 tons in May, a gain of 25 tons.

The steel works furnaces produced 2,323,194 tons in June against 2,452,930 tons in May, a loss of 129,736 tons. The output of merchant iron in June was 844,345 tons, against 871,714 tons in May, a loss of 27,369 tons.

A net gain of four in active stacks is shown in comparing the last days of June and May. The number of active stacks on June 30 was 325 against 321 on May 31. Six merchant furnaces were blown in and three blown out in June, a net gain of three.

PRODUCTION OF MERCHANT AND NON-MERCHANT PIG IRON BY SIX-MONTH PERIODS, 1916-1912.

	Merchant.	Non-Merchant.
1916, first half	5,162,123	14,011,115
1915, second half	4,385,481	12,977,438
1915, first half	3,033,585	8,915,935
1914, second half	2,862,290	7,629,736
1914, first half	3,647,821	8,602,840
1913, second half	3,961,519	10,238,194
1913, first half	4,609,689	11,571,290
1912, second half	4,023,031	11,275,918
1912, first half	3,348,704	10,401,027

TOTAL PRODUCTION OF PIG IRON FOR SIX-MONTH PERIODS, 1916-1907.

	First half.	Second half.	Grand total.
1916.....	19,381,954	.....	.....
1915.....	12,043,503	17,529,658	29,573,161
1914.....	12,372,580	10,598,346	22,970,926
1913.....	16,317,354	14,335,413	30,652,767
1912.....	13,877,830	15,447,683	29,325,513
1911.....	11,403,281	11,795,320	23,198,601
1910.....	14,758,449	12,086,865	26,845,314
1909.....	10,820,672	14,516,330	25,337,002
1908.....	6,789,463	8,890,677	15,680,140
1907.....	13,213,704	12,086,028	25,299,732

Four steel works furnaces were relighted and three blown out, a net gain of one.

The output of ferro in June was 22,110 tons, against 21,384 tons in May, a gain of 726 tons. Spiegel production in June was 24,169 tons against 18,556 tons in May, a gain of 5,613 tons.

The merchant furnaces blown in were: One Vanderbilt, Woodward Iron Co.; Jisco, Jackson Iron & Steel Co., June 22; Rebecca, Kittanning Iron & Steel Mfg. Co., June 29; Keystone, Reading Iron Co., June 2; Low Moor "B", Low Moor Iron Co., June 12, and Radford Crane, Virginia Iron, Coal & Coke Co., June 3. Those blown out were: Hokendauqua No. 1, June 24, and Lock Ridge No. 8, Thomas Iron Co., June 11, and Buena Vista, Alleghany Ore & Iron Corporation, June 4.

The steel works furnaces blown in were: Ensley No. 6, Tennessee Coal, Iron & Railroad Co., June 19; one Minnequa, Colorado Fuel & Iron Co., June 1; one Donora, American Steel & Wire Co., and the new Cambria

MONTHLY PRODUCTION.

	1916.	1915.	1914.
January	3,171,878	1,591,024	1,879,336
February	3,078,548	1,666,592	1,888,607
March	3,327,630	2,046,280	2,341,551
April	3,225,496	2,114,518	2,261,501
May	3,364,584	2,255,157	2,097,019
June	3,213,818	2,369,932	1,904,566
Total 1st half.	19,381,954	12,043,503	12,372,580
July	.....	2,563,311	1,955,324
August	.....	2,774,825	1,996,483
September	.....	2,834,342	1,882,718
October	.....	3,120,340	1,767,227
November	.....	3,035,235	1,501,269
December	.....	3,201,605	1,495,325
Total 2d half.	.....	17,529,658	10,598,346
Grand total.	19,381,954	29,573,161	22,970,926

JUNE PIG IRON

States.	No. of stacks.	No. in blast last day of month. June.	May.	Total tonnage made. Merchant.	Non-Merchant.	Totals. June.	May.
Pennsylvania	156	131	131	247,123	1,068,658	1,315,781	1,384,254
Ohio	75	66	65	185,688	540,174	725,862	742,491
Alabama	45	29	27	136,677	67,712	204,389	223,542
Virginia	22	8	7	28,291	.....	28,291	32,298
New York	26	20	20	80,352	109,993	190,345	210,747
New Jersey	6	1	1	6,379	.....	6,379	6,686
Illinois	26	22	23	49,456	265,764	315,220	337,587
Colorado	6	4	3				
Indiana	10	10	10	32,366	214,734	247,100	249,421
Maryland	4	4	4				
Wisconsin	6	5	5				
Kentucky	7	4	4				
West Virginia	4	4	4	47,976	30,071	78,047	81,547
Tennessee	17	11	11				
Washington	1	0	0				
Georgia	2	0	0				
Texas	3	0	0				
Minnesota	3	3	3	30,037	26,088	56,125	56,071
Michigan	3	3	3				
Missouri	1	0	0				
Spiegel—All states...						24,169	18,556
Ferro—All states....						22,110	21,384
Totals	423	325	321	844,345	2,323,194	3,213,818	3,364,584

No. 9, Cambria Steel Co., June 5. Those blown out were: South Works No. 5, Illinois Steel Co., June 17; Cambria No. 7, Cambria Steel Co., June 17, and one Lucy, Carnegie Steel Co., June 28.

The Woodstock Operating Corporation will blow in one furnace at Anniston, Ala., about July 15. Woodward No. 2 furnace, Woodward Iron & Steel Co., was out 21 days last month for relining. It is now running on basic. Colebrook No. 1 of the Lackawanna Iron & Steel Co., which has been running on ferro-manganese, was put on iron during June. Etowah No. 1 of the Alabama Co., at Gadsden, Ala., will be put into blast about Sept. 1.

ACTIVE STACKS ON LAST DAY OF MONTH FOR PAST TEN YEARS

	1916	1915	1914	1913	1912	1911	1910	1909	1908	1907
January	304	165	199	297	227	210	311	234	139	311
February	312	179	219	306	235	226	311	233	150	308
March	315	190	232	278	237	236	310	229	154	304
April	320	197	212	297	239	220	291	224	146	327
May	321	207	198	285	243	206	279	236	145	329
June	325	221	193	283	242	202	271	240	154	341
July	...	234	187	264	245	196	254	258	166	335
August	...	246	187	260	254	206	244	278	181	329
September	...	266	180	258	262	216	234	297	189	328
October	...	276	162	244	280	214	230	309	200	314
November	...	285	150	225	289	214	218	311	212	226
December	...	295	154	191	291	215	193	314	221	154
Average	...	230	189	266	254	213	262	264	171	301

Ore Shortage

Is Feared in Some Quarters—More Boats Ordered

New York, July 5. (By wire.)—Possibility of ore shortage next winter has received serious consideration from some large interests. High opinion in the industry inclines to the belief that the year's movement will fall short of the expectation by several million tons.

The American Ship Building Co. has closed for several additional boats, making five recently. New ships include one for Davidson Lumber Co. interests and one for a lake limestone company.

Corporation Activities

New York, July 5. (By wire.)—The new Schoenberger plate mill of the American Steel & Wire Co. at Pittsburgh will start about the middle of August with a capacity of 75,000 to 100,000 tons annually. The corporation has ordered large extensions to the foundry at Gary.

It is not likely that works construction of its new Ojibway plant in Ontario will begin before next spring. Town and harbor work now are being done.

The LaBelle Iron Works, Steubenville, O., hopes to complete its new by-product coke oven plant of 94 ovens of the Koppers type by Oct. 1. Each oven will have a capacity of 12½ tons.

Heavy Buying

Brings New Life to the Scrap Market at Pittsburgh

Pittsburgh, July 5. (By wire.)—The scrap market is rather excited as the result of heavy purchases of the last few days by the Carnegie Steel Co., which is understood to have taken from 30,000 to 50,000 tons of heavy melting steel for July delivery to its Homestead steel works at Munhall, Pa. While no official information has been given out by the purchaser, it is understood that the material was obtained at from $16.50 to $17.25, delivered. The tonnage will be shipped from the Pittsburgh, Cleveland and Chicago districts to fill the order. No other melters have figured in the market recently.

The market, although much stronger than previously, is still somewhat uncertain, dealers reporting today that they have picked up small tonnages as low as $16. The Carnegie Steel Co., three months ago, paid as high as $18.50 for heavy melting stock. It is understood that one of the heaviest melters has bought about 10,000 tons of turnings at $9, delivered.

Rioters Sentenced

Pittsburgh, July 3.—Fred H. Merrick, John H. Hall, Rudolph Bloom, Anna Goldberg, strike leaders, were sentenced to the county workhouse and the jail in criminal court Saturday for the part they played in connection with the riots at Braddock, May 1 and 2, when three men were killed near the plant of the Edgar Thomson works of the Carnegie Steel Co., which were stormed by a frenzied mob of Westinghouse strikers. Five other men received sentences to the county jail and workhouse for periods extending from six months to one year; seven men were paroled for from six months to a year.

Great Iron Ore Movement

June Surpasses the Record Breaking Movement of May by More Than a Million Tons

Cleveland, July 3.—Ore shipments for May on the Great Lakes, which established a new record for monthly shipments, were surpassed by over a million tons in June, the figures for the two months being 8,449,580 tons in May and 9,507,576 tons in June. The movement to July 1 amounted to the immense total of 19,615,567 tons, an increase of 8,094,284 tons, compared with 1915, or 70.26 per cent. The movement to date indicates that 55,000,000 tons could be moved during the season unless strikes or other events interfere.

Up to the present time, the labor troubles on the Mesabi have been rather sporadic and have not interfered with shipments.

The following are the shipments by ports, with comparative statistics for 1915:

Port.	June, 1915.	June, 1916.
Escanaba	720,264	1,159,424
Marquette	363,637	539,327
Ashland	604,127	1,101,370
Superior	926,536	1,945,234
Duluth	2,146,501	3,116,665
Two Harbors	1,244,026	1,645,556
	6,005,091	9,507,576
1916 increase		3,502,485

Port.	To June 1, 1915.	To June 1, 1916.
Escanaba	1,248,830	2,602,824
Marquette	547,002	1,154,140
Ashland	1,161,792	2,204,263
Superior	1,777,600	3,878,915
Duluth	4,295,811	6,325,990
Two Harbors	2,490,248	3,449,435
	11,521,283	19,615,567
1916 increase		8,094,284

(For complete prices see page 54.)

Field Guns

Will Be Bought By Government — Quick Action Requested

Philadelphia, July 3.—Manufacturers of ordnance in eastern Pennsylvania are working on a new inquiry from the government for several hundred field guns upon which quick action has been requested in view of the Mexican situation. The government, as previously noted, has closed with the Driggs-Seabury ordnance Co., Sharon, Pa., for 250 Lewis Machine guns. These weapons originally were purchased by one of the European belligerents which yielded them to the United States because of the pressing need of the latter for quick deliveries of such equipment.

Scrap Dealers Aroused

Purchase Made by Gary and Negotiations Pending for a Large Western Pennsylvania Buyer

Cleveland, July 5.—The local iron and steel scrap market Monday was aroused from a period of dullness by the news that negotiations were on foot for the purchase of a large tonnage of heavy melting steel for a large consumer in western Pennsylvania. Although information concerning the pending purchase is not sufficiently definite to be made public, it is known that dealers in the Pittsburgh district and in the Shenango and Mahoning valleys have closed for heavy tonnages on the strength of a large consumer coming into the market shortly.

In consequence of this turn in the affairs the market has responded only to the extent to give an element of strength to prevailing prices. A period of firmness is predicted to follow such activity as is mentioned above because a great deal of the material now on track will naturally be bought up first, thereby relieving the market of an acknowledged burden and exposing a solid working bottom. Neglible changes have occurred in the price list of most grades of scrap, except heavy melting steel which has dropped 50 cents to $14.25 to $14.75 a gross ton. The embargo of the Brier Hill Steel Co., Youngstown, O., has been lifted, and the one on the Riverside furnaces of the Corrigan-McKinney & Co. will probably continue only a few weeks longer. Railroads have put no lists before the local dealers during the past week.

Inquire For Borings

Cincinnati, July 3.—A good inquiry is out in the local iron and steel scrap market for cast borings, to be shipped to an eastern blast furnace, which will involve a purchase of about $25,000. The situation is weak, and extremely uncertain, as transactions are not of sufficient importance to test prices. A few sales of heavy melting scrap have been made around $14, per gross ton.

Dealers Encouraged

Pittsburgh, July 3.—Several sellers of old material express the belief that the general market is beginning to recuperate. According to some middlemen, heavy melting steel no longer is available at less than $16, although recent sales indicate that prices below that level have not disappeared. Pittsburgh dealers, unable to interest local consumers in material, now are being gradually excluded from adjacent districts, to which they turn for relief. Railroad embargoes against the shipment of scrap exist in the east, and Youngstown melters are refusing to accept additional tonnages. The embargo against the plant of the Brier Hill Steel Co., Youngstown, has been lifted, but shipments have not been resumed. Nearly all grades have reflected further weakness the last few days.

Big Tonnage Bought

Chicago, July 4.—Although much secrecy has been thrown about the transaction, it is well established that the Gary plant bought a round tonnage of heavy melting steel, probably about 15,000 tons, last week at a reported delivery price of $14.50 per gross ton. Although such a transaction at some times would have been of the highest importance, it is having little effect on the price market, except perhaps to stay the downward march of quotations for the time being.

Weakness continues to mark the situation and a number of products declined 25 cents to 50 cents during the past week. Just what could happen to give strength and restore prices to something like former levels, is beyond the imagination of dealers.

Railroad lists are offering only ordinary tonnages, the Santa Fe railroad offering 2,500 tons, the North-Western railroad 3,600 tons and the Belt Railway of Chicago 2,000 tons.

No Improvement

St. Louis, July 3.—There is no betterment in scrap conditions, the local market being at a standstill. Consumers apparently are covered for some time, and stocks in consumers' yards are heavier than they have been at any time for several months. For some weeks, there has been nothing but a consumers' market, but dealers now are refusing to sell at ridiculously low prices offered by the mills, and after July repairs have been made, the indications are that higher prices will prevail. The only railroad offering before the market is an open list from the New York Central, very little of which will come to this market

Weak and Dull

New York, July 3.—A weak and dull market prevails in old iron and steel material in this district. Dealers are finding it practically impossible to make sales at few offers being made by consumers which are on a low level. Some of them are not trying to do business at all and are waiting for the market to show more life. Some of the eastern Pennsylvania works are offering only $14 to $14.50, delivered, for heavy melting steel. An offer of $7.75, delivered, for turnings, was made here from the Pittsburgh district. Considerable demand for steel grades for export is current.

(*For complete prices see page* 54.)

Market at Standstill

Philadelphia, July 3.—Continuing weakness in old material has brought the market practically to a standstill in eastern Pennsylvania. Prices have dropped so low that except in stove plate, which has softened 50 cents further, they now are more stationary. Despite the dullness, the beginning of a better sentiment can be traced and this, it is believed, emanates from conditions in the Pittsburgh district, where more material is moving, especially among the brokers. The latter are inquiring more liberally in this territory for shipment to the Pittsburgh district. Most of the limited buying for eastern Pennsylvania delivery also is being done by the brokers or dealers. Small lots of heavy melting steel are being picked up at $14.75, delivered eastern Pennsylvania. Two mills the past week bought some quantity of wrought pipe at $12.50 and $13, delivered. Export demand is more active.

Many Cans Needed

Owing to Movement of Troops and Demand Heavier for Tin Plate

Pittsburgh, July 3.—The transportation of troops to the Mexican border has created further demand for tin plate, to be used for packing purposes. Large quantities of tinned goods are being shipped to the southwest and canning interests are attempting to buy additional tonnages of tin plate. So far as can be learned, mills in western Pennsylvania and eastern Ohio are not in a position to promise additional tonnages this year, and it is understood that similar conditions exist throughout the country. Such being the case, cans made for the general trade may be used to supply food for American soldiers. Mills have no difficulty in obtaining $6 per base box and some tonnage has commanded as high as $7 per base box.

Index is Ready

The index for *The Iron Trade Review* for the first half of 1916 has been compiled and will be sent to those whose names are on the regular list and others desiring it upon request.

Many Send Their Sons

Prominent Cleveland Families Represented Among the Soldiers —Troop A Starts for Camp Willis at Columbus

Several prominent Cleveland families, long identified with the iron business, are represented by young men who have enlisted as members of military organizations. Robert C. Norton, captain of Troop A, and his brother Laurence H. Norton, of the same company, are sons of D. Z. Norton, of Oglebay, Norton & Co. Sergeant Irving C. Bolton and his twin brother, Corporal Newell C. Bolton, are sons of Captain C. C. Bolton, for many years a member of the firm of M. A. Hanna & Co. Sergeant Bolton is a clerk at the office of the Upson Nut Co. and Corporal Bolton is a clerk at the offices of the Bourne-Fuller Co. Other members of the Troop are: First Lieut. Fayette Brown, of Stewart Iron Co.; H. P. Eells Jr., son of H. P. Eells, of the Bucyrus Co.; and D. R. Hanna Jr., of M. A. Hanna & Co. S. A. Fuller is second sergeant of the machine gun company, Fifth regiment, Ohio National Guard, and is a clerk in the Cleveland office of the Jones & Laughlin Steel Co. and a son of Willard Fuller, superintendent of the Upson Nut Co. Other soldiers are, Charles L. Weadow, of the engineers' corp, Fifth regiment, and F. J. Kahn, wireless telegraph operator of the DOROTHEA. Both are clerks in the employment of the Bourne-Fuller Co. Jay Riegel, advertising manager of the Osborn Mfg. Co., is a member of the engineers.

When Troop A started for Camp Willis, Columbus, on July 4, some very prominent men of the iron business, most of them former members of the troop, bade them goodbye, including Samuel Mather and his son, Amasa S. Mather; C. C. Bolton Sr., who was captain in 1894, and son, Chester C. Bolton, a veteran trooper; D. Z. Norton, James H. Hoyt, Frank Billings, Stewart H. Chisholm, Douglas Chisholm, H. O. Stebbins, and Wilson B. Hickox.

Many From East

New York, July 3.—Many iron and steel officials in the metropolitan district have been called to the colors of their respective regiments of state troops by the Mexican trouble. A number of others have been enlisting in the National Guard for service along and beyond the Rio Grande. The iron and steel trade generally in this district is represented liberally in the outgiving of patriotism shown in all lines of business. With some of the larger steel offices in New York City, such as the United States Steel Products Co. and the American Steel & Wire Co., as many as 15 to 20 employes each already have gone to the Mexican border or are in mobilization camps waiting for orders to entrain.

Raynal C. Bolling, general solicitor of the Steel Corporation, is first lieutenant in command of the First Aero company of the New York National Guard which is now at Mineola, L. I., awaiting orders to move to the front. Henry M. Kidder, one of the junior counsel in the law department of the Steel Corporation, is with Squadron A, New York City. Among other employes in New York City iron and steel officers who now are with their troops are E. W. Stearns, engineer of the American Bridge Co., who is with company A of the Seventh regiment; Bayard Cummings of the American Sheet & Tin Plate Co. is with troop C of the First cavalry, Brooklyn; Heath Noble, junior clerk in the office of Rogers, Brown & Co., is a member of the Fourteenth regiment, Brooklyn; Wm. Pape, of the Lackawanna Steel Co., is with the Staten Island cavalry. There are many others in this list. W. S. Rogers, son of W. A. Rogers, and assistant to the president of the Rogers, Brown Iron Co. has been called out with his troop of Buffalo cavalry. Chester Shepard, son of W. T. Shepard of Rogers, Brown & Co., Buffalo, also has joined the ranks. Walter E. Clarke, of the office of John Reis, vice president of the Steel Corporation, is with the Sixty-ninth regiment of New York.

H. S. Lester, a machinery salesman with Manning, Maxwell & Moore, Inc., New York, has left for the front as a private in the recently organized First Armored Motor Battery, National Guard of New York, the equipment for which was donated by Judge E. H. Gary, Charles M. Schwab and a number of other prominent steel men. Others among the Manning, Maxwell & Moore organization who now are in active service are Henry B. Smith, Company F, Seventh regiment, National Guard, New York; F. M. Hudson, Company H, Twenty-third regiment; Thomas H. Crowne, Troop A, First Cavalry; Alfred Bellos, Corporal, First Battalion, Second Field Artillery, and Jacob Haueter Jr., Company C, Fourteenth regiment, National Guard, New York.

In addition to those who are with the active service at present, a number of iron and steel men are enrolling in the citizen's camp for military instruction at Plattsburg, N. Y. Four representatives of Rogers, Brown & Co. will be members of the third camp at Plattsburg, from July 12 to Aug. 5. These are R. W. Clark of the New York office, C. E. Bertie of the Philadelphia office and Standish and R. D. Meacham of Cincinnati.

Philadelphia Recruits

Philadelphia, July 3.—Among the iron and steel men in this territory who now are with their regiments for possible service in Mexico are Robert Bolling, brother of R. C. Bolling, general solicitor of the Steel Corporation, who also is in service. Arthur Parsons and Albert White, all employes of the Philadelphia office of the Carnegie Steel Co.; R. C. Mc Curdy, treasurer of the Delaware River Steel Co., Chester, Pa., has just returned from the military training camp for citizens at Plattsburgh.

Car Company's Improvements

Extensive improvements to the plant of the Kuhlman Car Co., Cleveland, now under construction, include a steel car body shop, 80 x 440 feet. This shop will be devoted to the construction of steel bodies for street railway cars. The new building is a steel-frame structure with brick walls and fireproof roof and is fitted with steel sashes. Changes in the track work and other alterations to the plant are being made. The power house is being enlarged by the addition of two 315-horsepower Sterling boilers and by a radial brick stack 8 feet, 6 inches in diameter x 200 feet high. Westinghouse, Church, Kerr & Co., New York, are the engineers in charge. The Blaw Steel Construction Co., is performing the steel work and the general contract for the remainder of the construction is being carried out by the John I. Thompson & Sons Co., of Cleveland.

Twisted Bars Scarce

Cincinnati, July 3.—Warehouses report a shortage of twisted reinforcing bars. Demand for this material is good, and warehouses are experiencing considerable trouble securing shipments from mills. Shapes and plates, which are quoted from 3.20c to 3.50c, and are also selling in good lots. Cold rolled bars are scarce, and are quoted at the list price plus 10. Hot rolled bars are given from 3.20c to 3.75c, f. o. b. Cincinnati.

The St. Joseph Lead Co. inquires for prices for 36,000 tons of furnace coke.

Few Cars Bought

And Russia Entered Principal Locomotive Business Last Month

New York, July 5.—June was another month of light purchasing volume in cars and rails. The month also would have been a quiet one in locomotives had it not been for the virtual closing of the 800 to 1,000 for the Russian State railways, in which the final details of distribution and manufacture still are to be arranged. In fact, about two-thirds of the new railroad orders of the past month came from foreign countries.

Car awards in June totaled about 5,100, according to the statistics of *The Iron Trade Review*. This compares with about 4,500 in May; 7,000 in April; 8,750 in March; 12,900 in February, and 21,700 in January. The Havana Central, which recently bought 510 cars from the Pressed Steel Car Co., has ordered 140 flats from the Standard Steel Car Co. and 200 flats and 100 cane cars from the American Car & Foundry Co.

Domestic rail orders in June were practically negligible, and totaled about 25,000 tons. Foreign roads by far closed for the greatest tonnage. The French government railways officially closed with an eastern independent railmaker for 60,000 tons additional, bringing the total of the different orders placed by this buyer in this country during the past six to eight months to more than 200,000 tons. Although it is generally understood that the Steel Corporation will roll 150,000 to 175,000 of the 350,000-ton Russian inquiry. This business appears not to have been fully distributed. Independent mills have submitted prices on various tonnages and these hold good only until July 15, so that early action now is awaited. Foreign rail orders definitely closed in June reached about 100,000 tons. About 50,000 tons other than for Russia remain in the market.

Rails and Track Equipment

Pittsburgh, July 3.—Manufacturers of rails and track equipment have been approached by men believed to represent the government for rather heavy tonnages for the construction of lines in the southwest. If the United States becomes involved seriously with Mexico, a net-work of tracks will be built in the theater of activity. Railroad spikes continue somewhat weak and irregular. Prices above 2.65c gradually are disappearing.

The Cambria Steel Co., Johnstown, Pa., now is operating the plant of the Globe Foundry Co., that city, which recently was acquired by the Cambria company. Heavy and light machine castings are being made in the foundry.

Shafting Prices

Pittsburgh, July 3.—Cold rolled steel shafting is being sold at 20 per cent off the list for future shipment, although some mills are asking as high as 10 per cent off the list for delivery at their convenience. Material for prompt shipment is commanding five per cent off the list and warehouses are selling shafting at from 20 to 40 per cent on the list.

The Emerson-Brantingham Co. of Rockford, Ill., is about to place in operation a department for the manufacture of automobile bodies.

The Non-Ferrous Metals

Copper Lead Spelter Tin

THE closing of the half year ended June 20 found only aluminum, lead and copper at a price level equal to or higher than that which prevailed at the opening of 1916. During that period, new high levels were established in all of the leading nonferrous metals with the exception of tin and spelter, these metals having gone respectively to the new high levels of 58c and 28c during the first half of the preceding year. The nearest approach to these prices in 1916 was when tin advanced to 55c in March and spelter to 21c in February.

The new high records established during the first half of this year are as follows: Copper, (electrolytic) 30.75c, New York; lead, American Smelting & Refining Co., 7.50c, New York, and outside market, 8.12½c, New York; aluminum, 65.50c, New York; and antimony, 45c. The opening, low and closing for the half year are as follows:

	Opening.	Low.	Closing.
Copper	23.12½	23.12½	26.62½
Tin	45.00	38.75	39.50
Lead	5.75	5.75	7.00
Spelter†	17.37½	10.75	10.75
Aluminum	57.00	54.00	62.00
Antimony	41.00	17.00	17.00

New York base except where otherwise specified.
†St. Louis.

The New York Market

New York, July 3.—The metal markets generally have reflected a reactionary price tendency during the week. This has been especially pronounced in spelter, which so far has been without a bottom. Up to recently, the second hands were the most eager sellers, but some producers now are anxious to take business at prevailing prices. The feature has been the willingness of producers to reduce their premiums on the better grades. Prime western now is quoted as follows: Prompt, 10.25c to 10.50c, St. Louis; July, 10c to 10.25c; August, 9.75c to 10c; Sept., 9.50c to 9.75c; fourth quarter, 9c to 9.25c. Brass special spelter for prompt shipment is quoted at 11.50c to 12.50c, St. Louis. During the week the outside copper market has been characterized by lack of demand and pressure to sell and these factors have brought about price recessions. Electrolytic in the outside market is quoted as follows: Prompt and July, 26c to 26.50c, cash; August and Sept., 25.50c to 26c, cash; Oct., Nov. and Dec., 25c to 25.50c, cash. Ordinary lake copper for prompt shipment is quoted at 26.25c to 26.75c, cash. Ordinary casting copper is quoted at 23.75c to 24c, cash. Producers have not reduced their asking prices which are understood to be between 27.50c and 28.50c, for the last quarter.

The lead market has been firm on prompt and July, but there is no demand for positions farther off and, as a result, futures are offered at material concessions. The feature of the market is the scarcity of desilverized lead for prompt shipment. This is held at a premium of about $2 a ton over soft Missouri brands. The outside market is quoted at 6.65c to 6.75c, St. Louis, and 6.80c to 6.90c, New York. The American Smelting & Refining Co. continues to quote 7c, New York, and 6.92½c, St. Louis.

The tin market has been comparatively inactive and prices have reflected an easy downward tendency. Spot is quoted at 39.25c, New York. Ex-steamer quotations are approximately as follows: July, 39c; August, 38.75c; Sept., 38.50c, etc.

The antimony market, which was active a week ago, now is dull, and is characterized by shading by second hands. Spot antimony now may be quoted at 16c to 17c, New York.

Aluminum is somewhat more plentiful in the outside market and demand is dull; as a result, prices have fallen off. Spot carloads of No. 1 virgin ingots are quoted at 60c to 62c, New York; No. 1 remelted, at 58c to 61c and No. 12 alloy at 48c to 50c.

The nickel market continues strong. Shot and ingots are quoted at 45c, per pound and electrolytic nickel at 50c.

(For complete prices see page 54.)

Making Gages for Shrapnel Shells

A TIMELY description of the most important types of gages used in the manufacture of munitions. The author emphasizes the fact that a complete set of reliable gages is absolutely necessary in making shells. Inaccurate, cheap gages are worthless. The day of expensive old-fashioned polished gages is past

BY ALBERT A. DOWD

MANY factors of importance enter into the design and construction of gages for the manufacture of munitions. The government inspection on this class of work is extremely rigid, and the limits of accuracy are closer than in most lines of mechanical work. American manufacturers have fulfilled innumerable contracts for munitions of all kinds during the present European war, and the importance of gaging the product received early attention. In some cases manufacturers who were unfamiliar with the requirements have been tempted by large profits to take over contracts on various kinds of munition work. Some of these manufacturers, fully cognizant of their own lack of knowledge, have employed expert outside advice, while others have trusted themselves to men who have been lured away from other munition factories and have suffered from their incompetence. Others have gone into the work blindfolded, without proper preparation or adequate information, and they have suffered disaster. In some cases a lack of proper equipment has forced the use of methods and tools unsuited to the work in hand, so that the resulting product has not been sufficiently accurate to pass the severe inspection tests. Then again, the planning of the various operations has not always received proper care and the jigs and fixtures have been rebuilt to conform to other methods. Due to the fact that all orders for munitions have been of the rush variety, other questions in manufacture have been made a secondary consideration, and the important point has

Importance of Jigs and Gages

AT THIS time, when it is becoming more and more generally realized that industrial preparedness must must go hand in hand with military adequacy, there is no more opportune subject to engage the attention of munition makers than that of gages and jigs. The successful manufacture of war materials on a large scale depends to a great extent upon the interchangeability of parts, which necessitates accurate standards being maintained in the construction of each detail. This is only possible when manufacturers are supplied with complete sets of reliable gages and jigs. One of the most important duties of the advocates of industrial preparedness is the organization of a system whereby such articles may be made in time of peace, so that in case of sudden need, munition makers may be promptly supplied. When this scheme is worked out to a satisfactory conclusion, and after the United States has on hand an adequate supply of gages distributed at convenient points throughout the nation, the problem of industrial preparedness will have been considerably simplified.

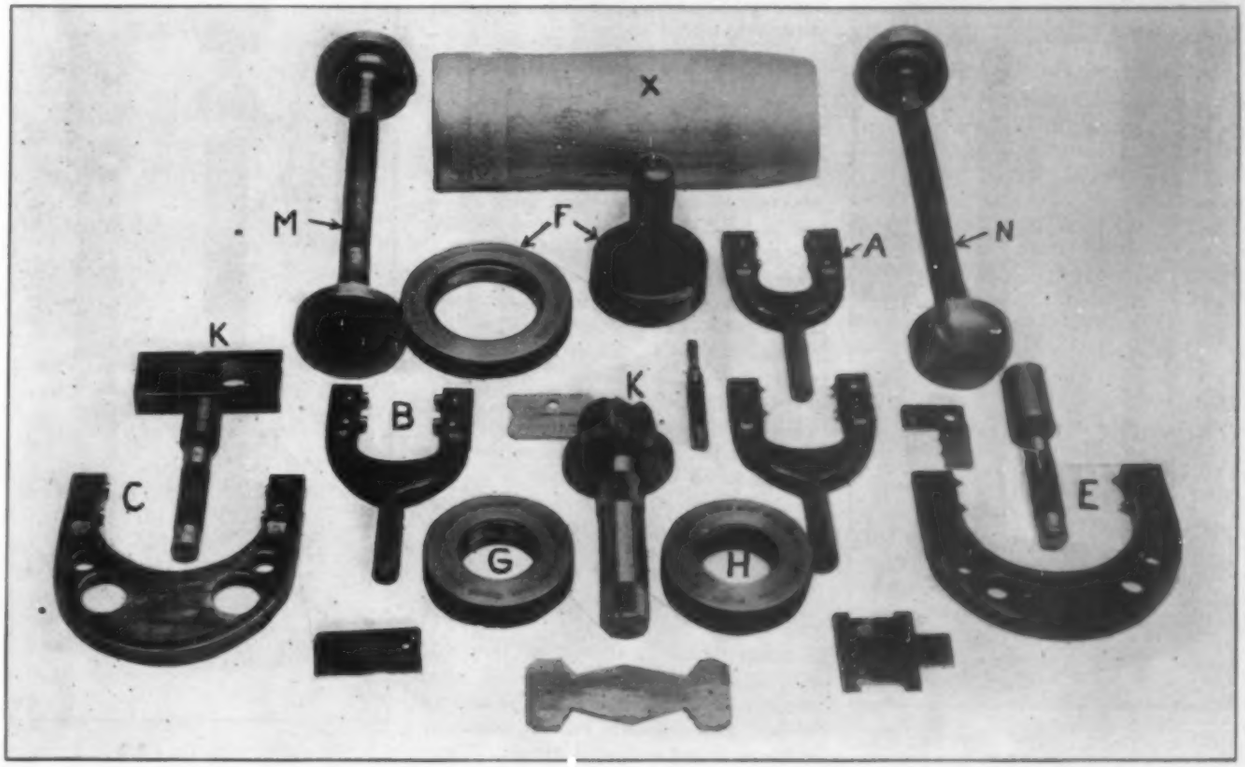


FIG. 1—A GROUP OF SIMPLE GAGES USED IN THE MANUFACTURE OF SHRAPNEL SHELLS

been to get out the work as accurately and as rapidly as possible

That standardization as applied to munition work is really important, will be clearly seen from the statement that all the parts in the modern military rifle can be assembled without the use of a file in fitting the parts. This applies only to work which has been most carefully planned, both in the sequence of operations and in the tools used. It is evident that if parts are to be so made that they will fit together without the necessity for filing, the greatest care must be used both in the machining processes and also in the method of gaging. The points from which the gaging is to be done must be very carefully selected, and the design of the gages themselves must be carefully studied in order that they shall fulfill every requirement.

A number of manufacturers have taken up the problems connected with the gaging of munitions of various kinds during the past two years and have specialized to some extent on the gaging proposition. Other manufacturers who have been directly connected with the manufacture of the munitions themselves, have studied the problem and have developed systems of gaging of their own. Since the design of any gage or mechanical device has much to do with its cost of manufacture, the matter of design is important and must be considered to a certain extent. Taking up the matter in a general way, it is first important to know what a gage should do and what it should be. Some years ago the "go" and "not go" types of gages were considered good enough for a great variety of work, but at present the tendency is toward the gage of the indicating type which will show variations, as well as whether the work has been machined within the correct limits of accuracy or not. The ideal type of gage, therefore, may be said to be one which will show at a glance whether the work is within the prescribed limits of accuracy. It should also indicate the amount of variation there is in the work. In using a gage of this type, it is an easy matter for an inspector to determine that the piece is within the required limits, and he can further ascertain whether the tendency is to run large or small and can counteract any tendency to err on the part of the workman by calling attention to the variation from correct dimensions.

Many of the gages used in the manufacture of various kinds of munitions are arranged to gage some interior point or points which may be in such positions that they cannot be readily seen. For work of this kind a gage must be designed so that the readings will be taken outside of the work. A number of the gages for shrapnel are arranged in this way, the indicator on the gage serving to tell the inspector just what the variation is and in what particular direction.

Economics of Gage Manufacture

The manufacturer of munitions, has two paths open to him in connection with his gaging work. He can either buy the gages from some manufacturer who specializes along these lines, or he can make them himself. When he buys the gages from an outside manufacturer, he can specify that he wants gages to cover a particular product such as a 3-inch shrapnel shell, such as that shown at *X* in Fig. 1, or he can make some of the gages himself, or even use micrometers on certain portions of the work and dispense with gages. It is, however, the part of wisdom for any manufacturer who desires to bring his production up to the highest efficiency, to see that the gaging end of the work is well looked after and that the gages are suited to the work in hand.

Fig. 1 shows a group of shrapnel gages made by the Wells Bros. Co., Greenfield, Mass. It will be seen that a number of these gages are of what might be called a standard type and all of the gages shown in this particular illustration are somewhat simple. Those shown at *A*, *B*, *C* and *E* are of the familiar "go" and "not go" types, having adjustable points which can be set to the desired limits. Gages of this kind can be purchased either with the point set to size or arranged so that they can be set by the customer. In addition to the gages mentioned, there are the familiar plug and ring thread gages *F*, *G* and *H*, and the adjustable thread gage *K*. It will be noticed that the threaded plug gage *K* is cut away to allow for inspection. Several sheet metal gages are also shown in this group, these gages being of special nature, yet of a simple type easily made. The two gages at *M* and *N* are special and are used for the inside of the shrapnel. These gages represent some of the simpler types of gages used in shrapnel manufacture, and the process of manufacturing munitions is greatly simplified by using something of this kind.

In taking up some of the problems connected with the manufacture of gages for work of this kind, we will consider some of the types known as indicating gages, which require more careful work and the services of expert toolmakers in their construction. There are a number of points to be considered in connection with the manufacture of gages when it is desired to produce these at minimum expense and yet within the required limits of accur-

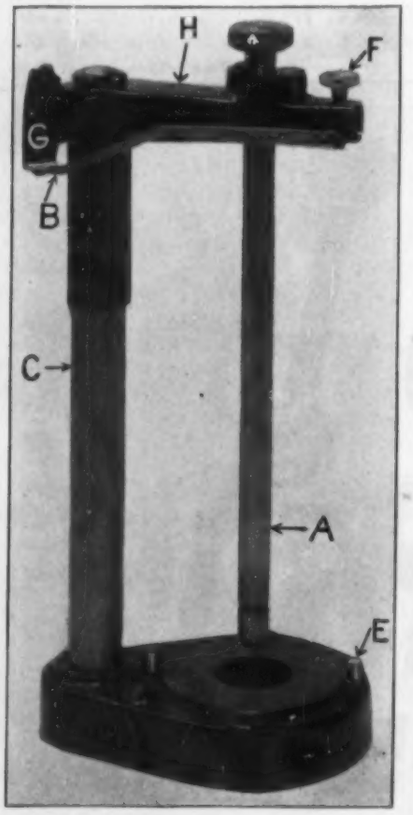


FIG. 2 — GAGE USED TO INDICATE THICKNESS OF THE BASE OF SHRAPNEL SHELLS

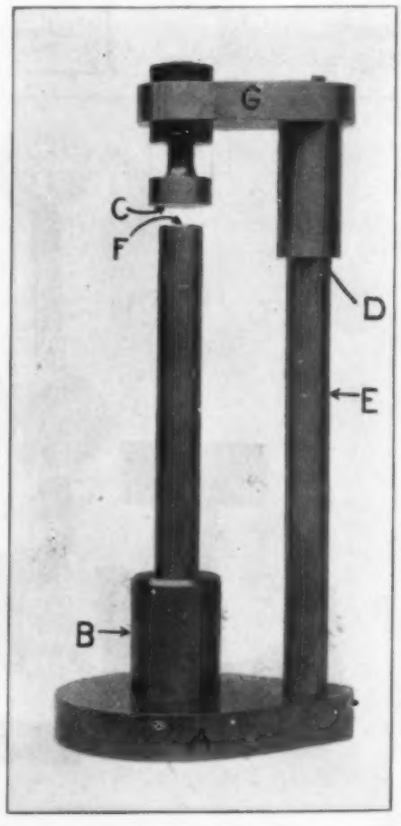


FIG. 3—GAGE FOR MEASURING THICKNESS OF SHRAPNEL SHELL BASE

acy. One of the first essentials in attempting the manufacture of gages for work of this character is a tool department in which the machines are well kept up and a group of workmen who can be depended upon to work in a careful manner so that accuracy will be assured. Just at this point it is well to note that the day when a gage of any kind must be finished all over and polished here and there in unnecessary places, has gone by, and at the present time the working parts of the gage or gages are the only ones which require the nicest kind of finish. Any manufacturer who contemplates the manufacture of gages would do well to look into this point and see that the toolmakers do not expend two-thirds of their energy in finishing up the gages to an unnecessary degree. It does not help the gage any to have a high finish on it and the extra cost of such work is considerable.

In designing gages, it is well to bear in mind that the simpler the type of gage, the less likely it is to become inaccurate due to dirt, chips or other foreign matter, and it is well to avoid delicate moving parts as far as possible. There are cases, however, when a gage must be somewhat sensitive and, therefore, the moving parts must be correspondingly light in order that they may have the necessary flexibility. Convenience of operation is also an essential point in the design of gages, and it is well that this point be thoroughly impressed upon the designer. The inspection of work comes under the head of non-producing labor, so that the expense should be kept down as far as consistent. In connection with convenience of handling, it may be noted that at times the work will be of such a nature that it is easier to build a gage to fit into the piece as the work is lying on the bench or while held in the hand, and again it may be found better to build a gage of the type which will stand upon a pedestal and remain in a more or less fixed position while the work is brought to it. In the case of gages for shrapnel shells, it is frequently found desirable to make the gages in such a way that they do not have to be lifted or carried about from place to place.

A few of the types of gages made for shrapnel by the Wells Bros. Co., Greenfield, Mass., are indicated herewith in the various illustrations, and the accompanying description will give an idea of the care necessary in their construction to insure accuracy. The gage shown in Fig. 3 is an excellent example of a simple type of gage mounted on a pedestal, and arranged to measure the thickness of the base of an 18-pound shrapnel shell. Although this gage must be carefully made, its simplicity is commendable and it is sufficiently rigid to withstand hard usage. The gage consists of a base *A* carrying a standard *B* on which the open end of the shell centers itself, and having a smaller upright *F* on the end of which the inside of the shell rests. The swinging arm *G* is mounted on the upright *E* and the proper height is determined by the shoulder at *D*. It will be seen that the gaging button *C* can be adjusted by means of the two nuts shown and can be readily set to a size block placed between the upright *F* and the under side of the button, being afterwards locked in the desired position by means of the nuts. In use, the arm *G* is swung out of the way and the shell is placed over the upright on which it centers itself by the portion *B*, after which the arm is swung around until the button *C* takes the position shown. The permissible limit on this end of the shrapnel shell is 0.010-inch, so that it will be seen that the accuracy required at this point is not particularly close. In manufacturing a gage of this type it is important that the holes in the base in which the studs are placed be parallel and that the various shoulders be machined square. It is also important that the threaded portion of the button should be square with the under side of the button. Points which contact the work, and the bearings and shoulders at *D* should be sufficiently hard to withstand the usage. It can readily be seen that a gage of this kind is essential in determining the thickness of the shrapnel shell base and that its cost depends largely upon the way in which it is manufactured. It is oftentimes advisable to buy a gage from a firm which specializes along certain lines rather than to attempt the manufacture of a similar type of gage with improper equipment, for it is obvious that in the latter event the work would be unsatisfactory when finally completed.

FIG. 4—GAGE FOR DETERMINING THICKNESS OF SHELL OF CARTRIDGE CASE

Another gage of somewhat similar design is shown in Fig. 2, this, however, having an indicating arm so that variations can be clearly read on the scale. This gage also is supported on a pedestal *D*, on which the locating pins *E* are set, and has an upright *C* on which a swinging arm *H* is located. On the swinging arm is a plunger rod *A* to determine the thickness at the base of the shell. The variation in the over-all length is ascertained by a reading of the pointer *B* on the scale *G*, this pointer being so arranged that an adjustment can be made through the thumb screw *F*. This type of gage while somewhat more elaborate than the one shown in the previous illustration, is still of a comparatively simple type although it requires more skill in its construction than the previously mentioned. Some of the important points in the construction of this gage are the parallelism of the bearings in which the two moving members operate, and the various parts which are associated with the finger or pointer. There is, however, nothing specially difficult about any part of the construction, and a good tool-maker should have no difficulty in making a gage of this kind.

The gage shown in Fig. 4 is intended to gage the thickness of the cartridge case by means of the adjustable points at *G* and *H*. In this gage the base *A* is made of cast iron and has upon it a vertical shaft *B*, on which the arm *C* is located. This arm is provided with lugs *D*, under which the head of the cartridge rests. The two uprights *E* and

F form a part of the base casting and simply act as supports for the gaging points *G* and *H*, the construction of which is clearly indicated in the figure. This gage is made for a Russian 3-inch cartridge case, and although simple in construction, answers the purpose admirably.

Indicating Gage

The type of gage shown in Fig. 5 is a Russian inspection design for a 3-inch cartridge case and is frequently termed a semaphore gage. This is particularly designed to show the thickness of the base in the cartridge case by means of the point on the rod *G*. This is a very useful type of gage and indicates by means of the pointer *C* the variations in thickness of the base of cartridge case. The bracket *F* is mounted on the base *A* in such a way as to bring the rod perpendicular to the base on which are set the two locating pins *B* which guide the head of the cartridge case. The rod *G* carries a collar at its upper end on which is suitably mounted a pointer *C* which indicates variations on the scale *D*. This pointer is provided with an adjustment to the screw at *E*, so that it can be set within certain limits. The operation of the device is very evident and needs no further description. In the construction of this gage it should be noted that the rod *G* moves in a hardened and lapped bushing located in the upper lug of the bracket. The indicating lever and the graduations on the scale must be carefully made to insure correct registration. Applications of this principle can be made to many other kinds of indicating gages. Some of the strong points in this type of gage are its simplicity and accuracy.

Fig. 6 shows a more complicated type of gage which is arranged with two indicators *F* and *H*, which are so constructed as to show the variations in

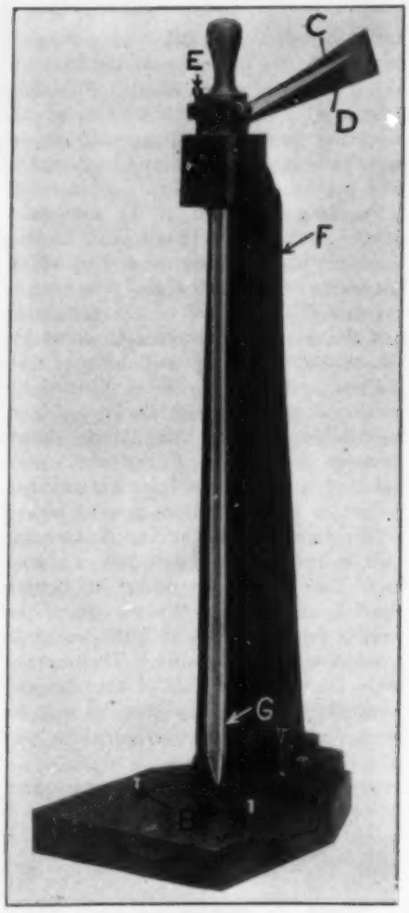


FIG. 5—SEMAPHORE GAGE USED TO INDICATE THE THICKNESS OF THE BASE OF 3-INCH RUSSIAN CARTRIDGE CASES

concentricity between the external and internal diameters of the shell. The greatest care is necessary in the construction of a gage of this sort as there are many chances for error in fitting these various parts. The base of the gage is of cast iron and is arranged with two separate lugs in which are mounted the rollers *C* on which the shell rests. A roll is also provided for the end of the shell at *C*. In operation, the projections *D* and *E* on the pointers *H* and *F*, respectively, are swung into position so that they register against the inside and outside surfaces of the shell, thus indicating the concentricity by the movement of the pointers.

Alignment Important

In the construction of this gage it will be noticed that the lugs which contain the rollers *B* are separate from the fixture body so that they can be properly aligned. Considerable care is necessary on the part of the toolmaker to make sure that the alignment of the rolls is correct as otherwise the registration would be impaired. The alignment must be made with the cylindrical bearing of the indicating bar *J*. The bearing for the indicator to register the outside diameter at *G* must be perpendicular to the plane in which the rolls lie. A requirement which is very necessary in this type of gage is the method by which the projections *D* on the pointer *H*, can be moved one way or the other in order to obtain the proper contact with the inside of the shell. It will also be noted that an adjustment is provided on the outside indicating pointer *F* in the two cylindrical nuts, which can be arranged so as to bring the projection *E* into the proper contact with the outside of the shell. Similar adjustment is also provided for the correct registration of the inner gage point *D*.

The examples of gages given herewith indicate the principal types of gages used on certain classes of munition work. The simpler types of gages such as plug and ring, receiver gages, etc., have not been mentioned because their construction is simple and needs no special comment.

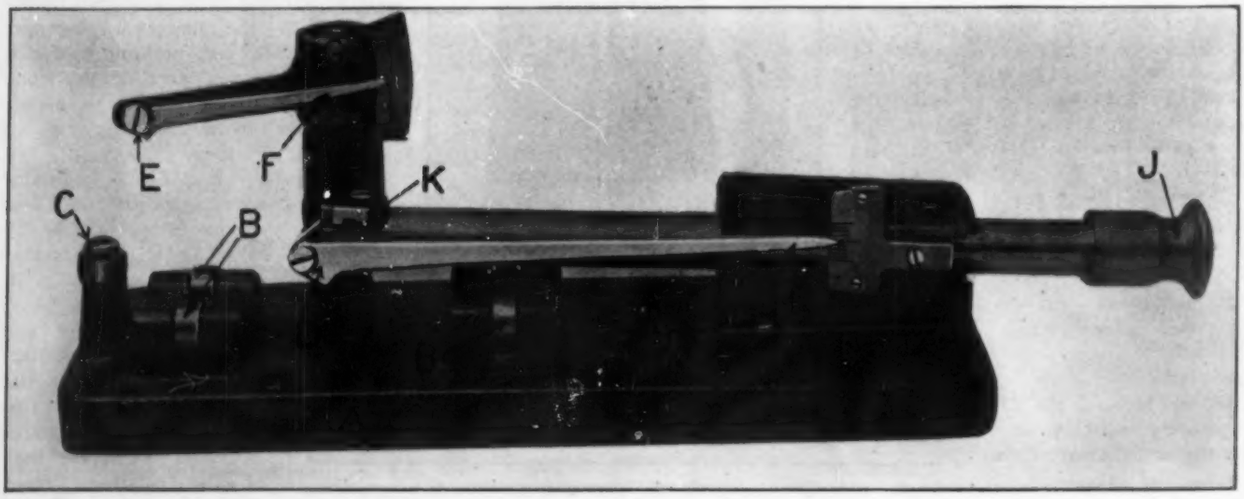


FIG. 6—RUSSIAN INSPECTION GAGE TO TEST CONCENTRICITY OF OUTSIDE AND INSIDE DIAMETERS OF SHELL

Cutting Efficiency of Tool Steel

THE AUTHOR of this paper has endeavored to show by a series of tests that no relation exists between Brinell hardness and lathe efficiency. Tools having comparatively low Brinell hardness numbers often prove more efficient both in cutting ability and length of service than those tools of higher numbers

BY J. O. ARNOLD

IN PAPERS recently read before the Iron and Steel Institute there has been a tendency to regard the Brinell and scleroscope numbers registered by hardened steels as an approximate measurement of their cutting efficiencies in the lathe. Indeed it has been suggested that, instead of ascertaining the efficiency of high-speed steels directly in the lathe, the Brinell test might be substituted for the costly and prolonged procedure of making systematic lathe tests. The purpose of this brief paper is to show that not only is there no relation between Brinell hardness and lathe efficiency, but also that a plain carbon turning tool with very high Brinell hardness may, on comparison with another tool of considerably lower Brinell hardness, register an efficiency of practically zero, while the tool of say 15 per cent lower Brinell hardness may run perfectly for as long as 18 minutes, and during the last five minutes of the test cut cleanly at a blood-red heat before breaking down.

The Brinell hardness of a properly hardened tool is an almost negligible factor of efficiency. The efficiency depends almost entirely on the thermal stability of the simple or compound hardenites in the hardened steel. The simple hardenite of plain carbon steel has a thermal stability of which the limit is certainly less than 300 degrees Cent., while the compound hardenite of a high-speed steel containing carbon, tungsten, chromium and vanadium, also secured by water quenching, may be rendered stable up to a temperature of about 700 degrees Cent. The proof of the foregoing statement is embodied in the accompanying table.[3]

If tested with the steels indicated in the table, a hardened best crucible-cast plain carbon steel, containing about 1.25 per cent combined carbon, would endure for perhaps two seconds. Therefore its endurance would be roughly 0.3 per cent of that of the tungsten-chromium steels and about 0.2 per cent of that of the steels containing tungsten, chromium and vanadium. Nevertheless its Brinell hardness would be about 700 as against the 600 numeral registered by the high-speed steels. Again, according to the mean Brinell test (602) the tungsten-chromium steels should average an efficiency of 0.3 per cent greater than the constant numeral (600) of the steels containing tungsten, chromium and vanadium, yet the actual efficiency of the latter is 63 per cent greater than that of the former. In a word, the Brinell and scleroscope tests, while valuable means of rapidly and approximately determining the elasticity of structural steels, are valueless, or indeed worse than valueless, for estimating the varying thermal stabilities of the hardenites which mainly determine lathe efficiency of the steel.

The author and Prof. A. A. Read have found that there are four single hardenites, or solid saturated solutions of carbides, namely, iron hardenite ($Fe_{21}Fe_3C$), vanadium hardenite ($Fe_{72}V_4C_3$), tungsten hardenite ($Fe_{24}WC$), and ferro-molybdenum hardenite ($Fe_{24}Fe_3Mo_3C$). The latter substance might be accurately classed as a sort of double hardenite. The double, triple and possibly quadruple hardenites of high-speed steels yet remain to be discovered, but the author and Professor Read are now proceeding with this complex research.

Tests of Cutting Efficiencies of Tool Steels

University steel No.	Type of steel compositions nearly identical for each type.	Duration of tests in minutes and seconds before breaking down. 1st grind. m. s.	2nd grind. m. s.	3rd grind. m. s.	Mean. m. s.	Efficiency. Cubic inches of standard hard steel shaft removed. 1st grind.	2nd grind.[1]	3rd grind.	Mean.	Brinell hardness No. pressure, 3,000 kilos.; Ball, 10 millimeters diameter.	Scleroscope hardness number average of four tests.
1523	Tungsten-chromium	10 7	11 45	9 26	10 26	47.4	56.3	43.3	49.0	600	82.8
1527	Tungsten-chromium	11 25	12 35	10 32	11 32	54.7	61.4	49.4	55.2	629[2]	80.5
1533	Tungsten-chromium	10 26	11 50	11 31	11 18	48.9	56.7	55.0	53.5	578	80.3
1522	Tungsten-chromium-vanadium	14 17	17 59	13 40	15 19[3]	72.3	96.2	68.0	78.9	600	80.3
1524	Tungsten-chromium-vanadium	17 2	17 49	16 57	17 24[3]	91.0	95.2	89.1	91.8	600	75.5
1528	Tungsten-chromium-vanadium	16 2	17 52	16 57	17 24[3]	84.1	95.7	89.1	89.6	600	76.3
1534	Tungsten-chromium-vanadium	15 21	17 10	15 45	16 27[3]	79.0	91.6	81.1	83.9	600	81.0

NOTE.—The Brinell and scleroscope hardnesses were taken as near as possible to the hardened cutting edges of the various tools.
[1]It will be seen that with both types of steel the maximum efficiency is obtained on the second grindings of all seven tools.
[2]Duplicate test 629.
[3]Throughout these tests the cutting edge of the tool was red-hot at the breakdown points, and indeed for about five minutes previous to breaking down.

Presented at the recent meeting of the British Iron and Steel Institute. The author, J. O. Arnold, is professor of metallurgy, University of Sheffield.

The Malleable Iron Range Co., Beaver Dam, Wis., has taken out insurance in favor of its employes. These policies are payable in the event of death of employes from any cause. The policy depends upon position and length of service.

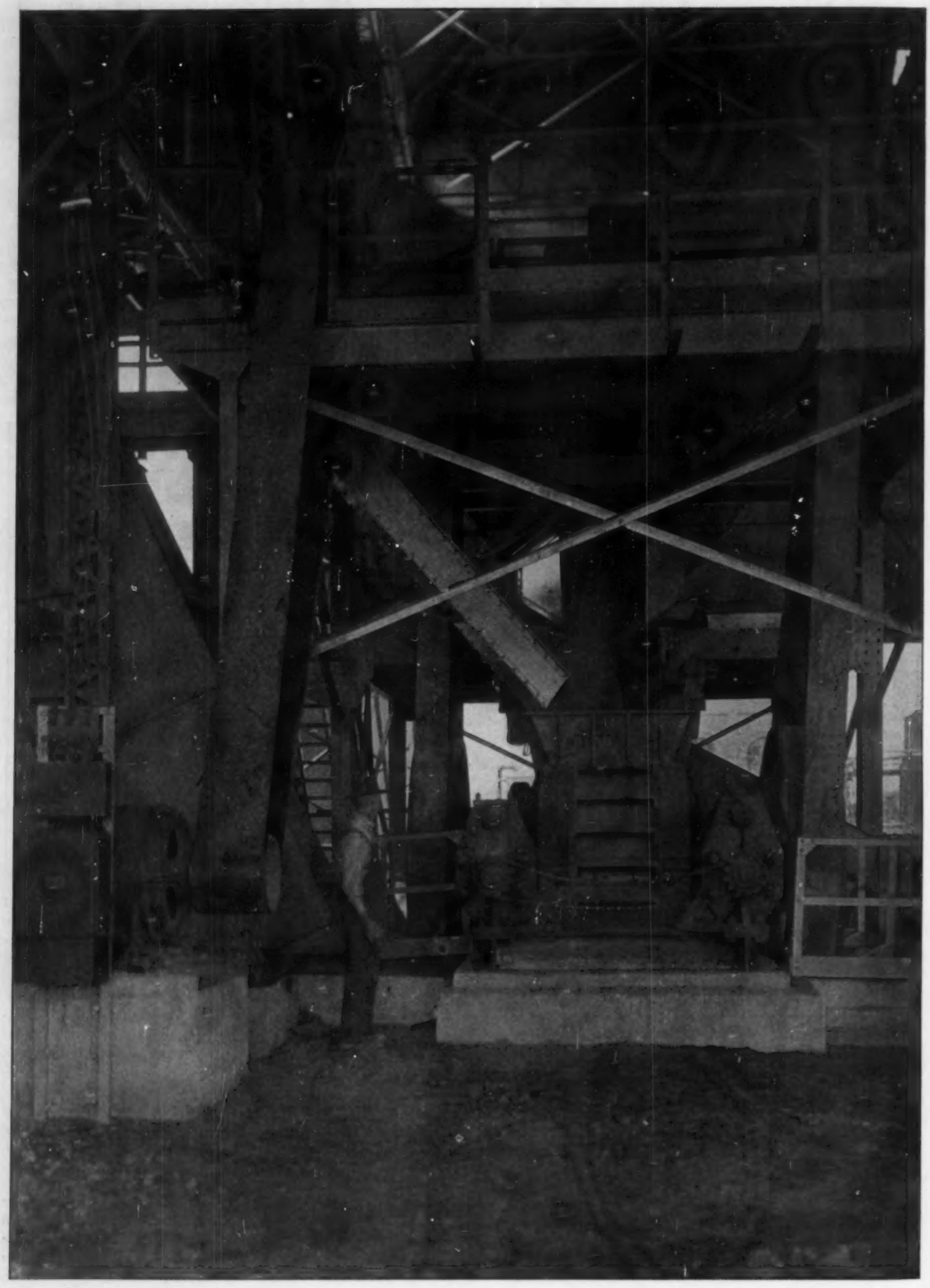


FIG. 1—MOTOR-DRIVEN SPIKE-ROLL CRUSHER FOR PRIMARY GRINDING OF DUPLEX BASIC PHOSPHATE

Making Basic Phosphate Fertilizer

A DESCRIPTION of the plant erected by the Tennessee Coal, Iron and Railroad Co. for reclaiming the excess phosphorus in southern iron ores and converting it into a phosphate fertilizer with unusual plant food qualities. The duplex process is employed with primary and secondary open-hearth furnaces

ONE of the characteristic features of the economic evolution of the American iron and steel industry during the past decade has been the development of facilities for the profitable recovery of by-products. Most of this work has centered on the reclamation of certain constituents of coal set free in the coking process, and the number of by-product coke ovens in the United States now exceeds 7,500, with an annual coke production of over 13,000,000 tons. The dislocation of the dyestuffs and chemical industries resulting from the European war has tremendously stimulated the erection of benzol and other extraction plants for the further recovery and refinement of coke oven products.

At the same time, the establishment of new methods for the recovery of by-products has been proceeding in other and totally different directions which will have the effect of appreciably extending the line of direct contact between the iron and steel business and the consuming public. One of the most interesting developments of this latter character is found in the south, where a practical method of manufacturing phosphate fertilizer from open hearth slag has been devised by the Tennessee Coal, Iron & Railroad Co., one of the subsidiaries of the United States Steel Corporation. The Tennessee company's work along this line has a double purpose in that it not only outlines a method of overcoming the disadvantages resulting from the relatively high phosphorus content of southern ores, but paves the way for the utilization of the surplus phosphorus on agricultural lands deficient in this element of plant food. The effort, therefore, follows the lines of true conservation and for this reason is of more than immediate economic significance.

Duplex Basic Phosphate

The fertilizer manufactured by the Tennessee company is known as duplex basic phosphate. It is a finely ground phosphatic fertilizer manufactured from a slag produced in the open hearth furnace in connection with the duplex, or more accurately speaking, the triplex process of manufacturing steel. To carry out this process successfully it has been found necessary to give as much attention to the production of a slag that will be suitable for fertilizer as to turn out steel of a satisfactory quality. The crude slag obtained from the furnace is ground in a series of mills to such fineness that 80 per cent will pass a 100-mesh screen. This finely ground slag, as prepared for market, contains a minimum of 18 per cent phosphoric acid and 45 per cent lime. Phosphorus, as is well known in agricultural circles, is an essential element of plant food. From 80 to 90 per cent of the phosphoric acid is soluble in a 2 per cent solution of citric acid and, therefore, is readily available as a plant food; the remaining 10 to 20 per cent is held in the soil and later becomes available. From 10 to 15 per cent of the lime in the fertilizer exists as calcium oxide or caustic lime, and as such is beneficial to most soils in that it corrects or neutralizes acidity.

Besides phosphorus and lime, duplex basic phosphate contains 6 to 9 per cent of magnesia; 4 to 10 per cent of silica; 10 to 18 per cent of iron oxide, and 1.5 to 3 per cent of manganese oxide. All of these elements are plant food but most soils contain an abundance of them. Duplex basic phosphate is essentially the same as Thomas phosphate or Thomas basic slag produced in Europe by the bessemer basic process of steel manufacture. Thomas phosphate has been used for many years as a fertilizer in Europe and furnishes about one-half of the phosphoric acid consumed on the continent.

The manufacture of this fertilizer involves the solution of both agricultural and metallurgical problems. Standard basic pig iron contains less than 1.0 per cent silicon, from 0.20 to 1.50 per cent manganese, about 0.05 per cent sulphur and approximately

FIG. 2—GENERAL VIEW OF FERTILIZER GRINDING PLANT AT ENSLEY, ALABAMA

0.020 per cent phosphorus. Basic pig iron manufactured from southern ores, however, contains from 0.85 to 1.0 per cent phosphorus.

In the usual specifications for open hearth structural steel the phosphorus is limited to 0.06 per cent. Specifications covering structural steel for bridges, ships, fire-boxes, boilers, etc., prescribe even lower limits, namely, 0.04 per cent. Southern mills roll large quantities of open hearth rails in which the maximum permissible phosphorus is 0.04 per cent.

When manufacturing rails or other high grade rolled steel products from southern pig iron containing 0.85 per cent phosphorus, it is necessary to remove over 95 per cent of the total amount of phosphorus existing in the pig metal, reducing it from 0.85 to 0.04 per cent. This, of course, is considerably more phosphorus than must be taken out of standard northern basic pig iron, and the refining cost is proportionately higher. The basic fertilizer process was devised to recover a portion of the phosphorus which otherwise would be lost and to pay some return on the expense of removing this element from the steel.

The process involves the utilization of an acid bessemer converter in conjunction with two open hearth furnaces, the first or primary open hearth furnace producing the high phosphorus slag, desirable for making fertilizer. In the manufacture of this fertilizer, standard southern basic pig metal containing normal amounts of carbon, manganese and sulphur, together with upwards of 0.85 per cent phosphorus is blown in a 20-ton acid bessemer converter producing a low-carbon, high-phosphorus steel. The carbon, in accordance with usual practice, is reduced to about 0.15 per cent. The blown metal is charged into a 100-ton primary, open-hearth furnace of the tilting type. In the primary furnace somewhat more than theoretical amounts of oxidizing material—scale and iron ore—together with lime, etc., are added to oxidize the phosphorus, producing a tetra-calcium phosphate slag containing the equivalent of 18 to 22 per cent of phosphoric acid. The primary furnace heats are tapped into a ladle in the ordinary manner, the slag flowing over into slag boxes placed near the ladle. These boxes are of cast steel with a capacity of about seven tons of slag. The steel may be poured directly into ingots if rolling specifications permit, but usually it is transferred to a second open hearth furnace for further refinement in the ordinary manner.

The slag is transferred in the boxes previously mentioned to the fertilizer grinding plant, Fig. 2, where it is dumped on the ground in the receiving shed, *S*. This shed is equipped with a 25-ton crane, provided with a magnet and skull cracker ball. The ball is used for breaking up the slag into chunks about eight inches in diameter. The broken pieces are picked up by a grab bucket and discharged into a steel receiving bin from which they are delivered to the first of a series of crushers. The material is passed through three different types of crushing or grinding machines which reduces it so that 80 per cent will pass through a 100-mesh screen. The finely ground produce is elevated and delivered by screw conveyors into 1,000-ton concrete storage bins, *B*, Fig. 2, of which eight are provided.

The bins are arranged to discharge their product into screw conveyors which deliver the material to a final set of elevators and screens. From the latter the finished material is discharged into a Bates bagging machine. This machine packs the fertilizer in 100-pound bags which are delivered direct to outgoing freight cars by means of a belt conveyor. The bagging operation is clearly illustrated in Fig. 5. Facilities also are provided for loading the material into the cars in bulk.

At considerable expense, a number of storage bins have been erected, with conveyors to and from them to facilitate a mixing arrangement which is necessary in order to produce a uniform product from the variable slags produced by the different heats in the steel plant, in order that the product be of a uniform quality.

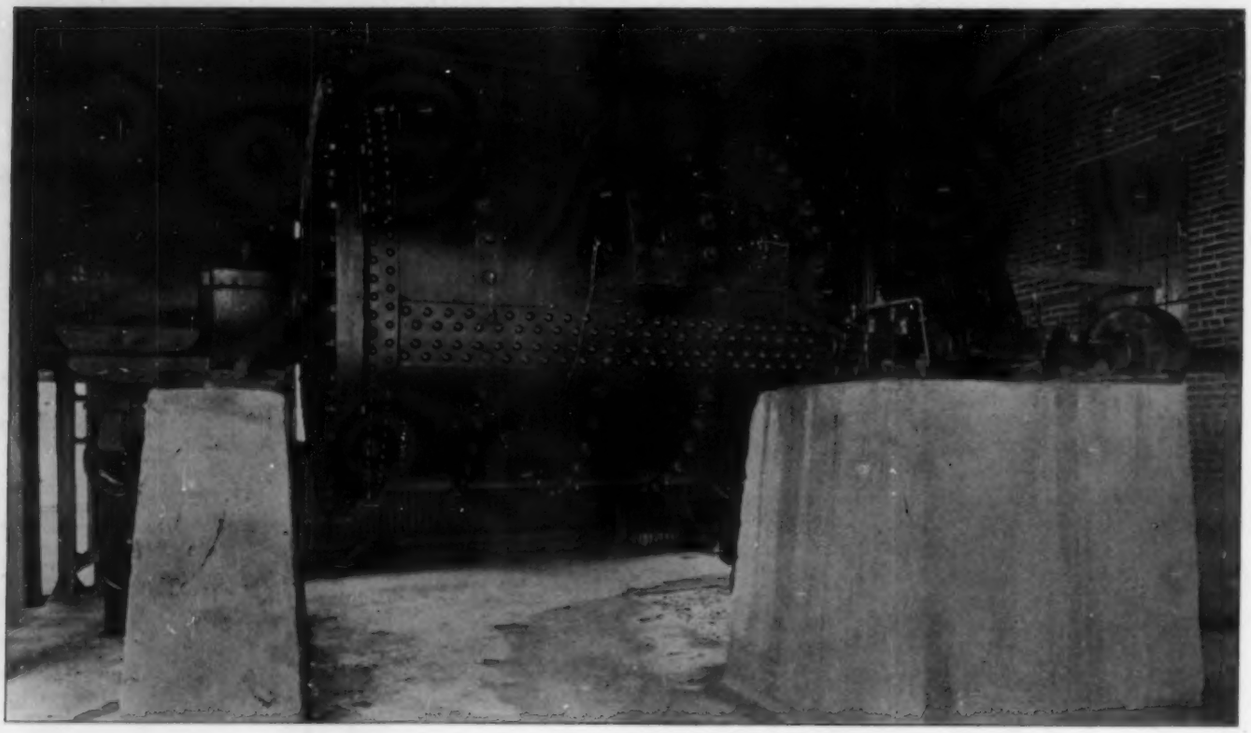


FIG. 3—BALL MILL FOR FINAL GRINDING OF FERTILIZER

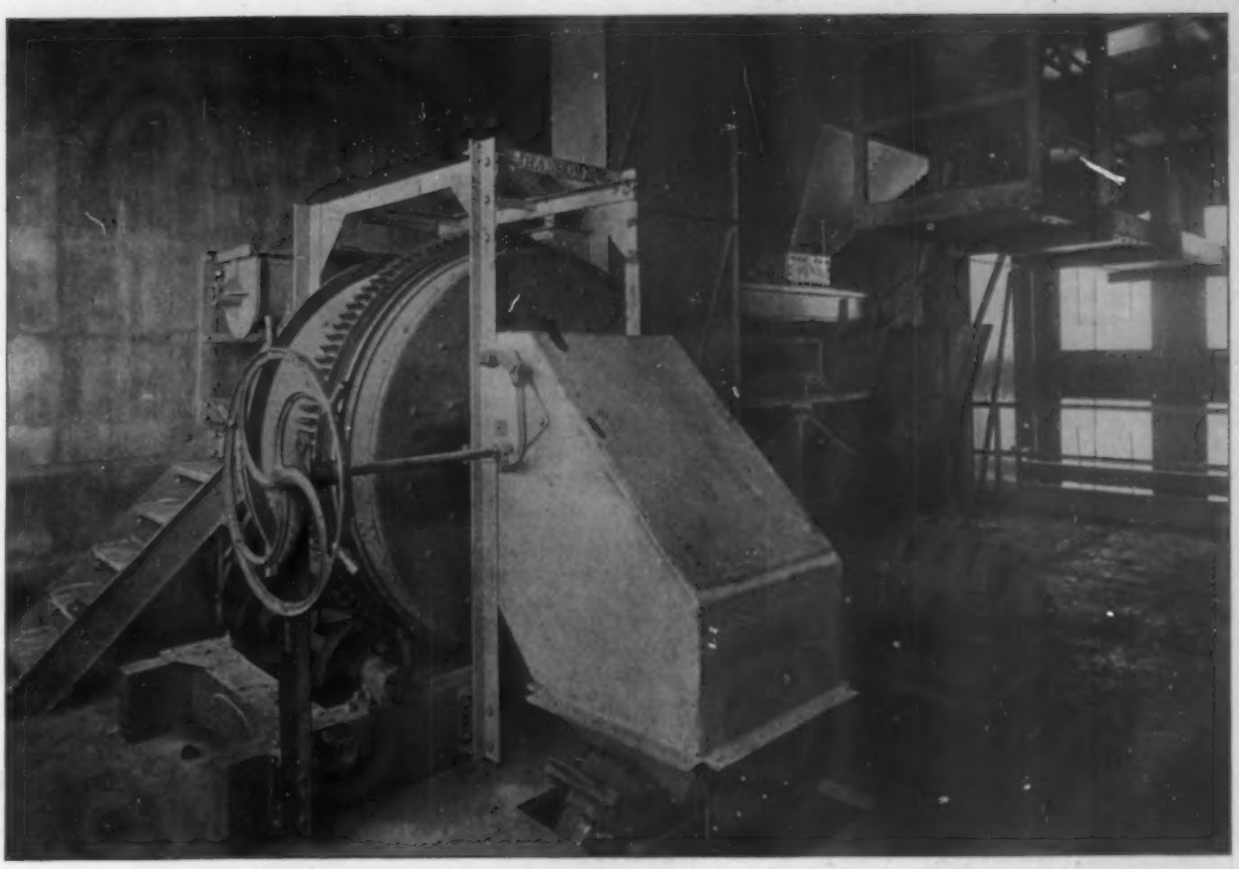


FIG. 4—A STANDARD CONCRETE MIXER IS USED FOR MIXING THE PRODUCT

FIG. 5—BAGGING MACHINE AND CONVEYOR FOR LOADING CARS

Machine Tool Prices and Deliveries

THIS ARTICLE presents a summary of the price changes of the past two years, with specific quotations on certain popular sizes of lathes. Deliveries are now more nearly normal than at any time since the war rush first began. Machine tool builders are well fortified against future market developments

BY RALPH H. JONES

IT WAS a well-known fact in business circles that George P. Louden prided himself on his ability to read the signs of the times. The remarkably modern shop and the efficient office organization of the Taper Tool Co. were the result of the guiding influence of the company's vice president, the man with unusual foresight. It was not out of the ordinary, therefore, when the purchasing agent was summoned to the office of G. P. Louden in order to discuss plans for an extension to the company's shops.

"Mr. Henderson," said Louden, "with that recent order for special tools on our books and two inquiries today for our prices, I am in favor of adding several more lathes to our present equipment."

"But, Mr. Louden, wouldn't it be better to wait and see how long the war is going to last? We won't have any use for those lathes when the present demand ceases. Our present equipment is satisfactory for our present needs."

"Quite true, Mr. Henderson, but lathes are going to be scarce after awhile. Better see what you can do."

Henderson made a few tentative inquiries and found that at that time, December, 1914, lathes were plentiful and might be had at almost a moment's notice. "It's funny," he thought, "that Louden is always chasing wild geese." However, he bought two 14-inch x 6-foot lathes for $416.25 each and installed them with some misgivings. Louden was partially satisfied but continued to harp upon the advisability of further purchases. It was to no avail. The purchasing agent knew his duties, moreover, he did not intend to spend the company's money uselessly. No more tools were purchased in spite of the fact that contracts for special equipment were coming in rapidly and there was some talk of war orders. There was still some unused capacity in the shop and Henderson waited.

Caught in the Whirlpool

What happened to Henderson and the Taper Tool Co. has happened to hundreds of other purchasing agents and manufacturers. When the demand for tool equipment skyrocketed they were unprepared to meet the rush. There is no doubt that many concerns were fortunate in having anticipated the crisis, but in a large measure the tremendous building boom which was initiated early in 1915 took place only after business opportunities had assumed astonishing proportions.

The first price change on machine tools took place March 25, 1915, and amounted to an average increase of 12½ per cent. This revision affected practically every type of machine. Deliveries also were revised. Large orders were shipped in three to five months, small requirements receiving attention in 30 to 60 days. It is a curious thing in connection with this first price change, that many orders which were then pending were promptly cancelled. Many prospective purchasers thought that prices would recede in a few months and refused to take the advice of tool dealers and purchase the equipment they needed, or which might be required for future development. It is likewise true that some concerns realized that this upward revision was but a preliminary step to even higher figures and placed contracts covering their next year's total requirements. It has been said that a price change at that time was imperative from the builders' standpoint. The shortage of material was being keenly felt, and the demands of labor had to be met, or at least compromised.

War orders, brides and babies were in order. No market was stationary for a sufficient length of time to draw comprehensive conclusions but it was the concensus of opinion that in spite of the efforts which were being made by the tool builders throughout the country, the demand for shop equipment would soon be far in advance of capacity. During May, 1915, deliveries were the object of a second attack by the harrassed manufacturers who guaranteed no shipments in less than four to six months. Not content, a price change was announced May 24. It amounted to an increase of 7½ per cent on milling machines, lathes and grinders. Huge orders were no longer startling. During the summer of 1915 the volume of business concluded for domestic as well as foreign concerns, surpassed anything known up until that time. Early in June it was intimated that there would be another price change within 30 days. July 20 marked this date, and a 10 per cent increase was announced. Deliveries were subjected to further delays; large orders required six to eight months for shipments.

The last price change was announced Oct. 4, 1915. It represented an average increase of 12½ per cent on all machines. Deliveries, however, were not retarded further, but since that date changes have been made from time to time in delivery specifications. At present the delivery situation is more nearly normal than at any period since the first stupendous influx of foreign business to this country.

American manufacturers were called upon to meet a crisis. It is sufficient to say that the crisis was met and the American tool builder is far better equipped today to fulfill the demands of foreign nations, is more able to supply the needs of this country, and is in a more advantageous position to meet foreign competition.

Machine Tool Prices and Deliveries

	Price, March, 1915.	Price, May, 1916.
14-inch x 6-foot double back-geared lathe. Regular equipment	$416.25	$ 715.00
17-inch x 8-foot, 3-inch shell making lathe..	539.38	1,016.00
30-inch x 10-foot heavy-duty engine lathe. Used for turning big naval shells.....	924.88	2,509.00

A Self-Contained Grinding Machine

IN THE economical manufacture of interchangeable parts for high grade machinery the grinding machine has proved indispensable. This article describes a new line of precision grinders designed for manufacturing service by the Modern Tool Co., Erie, Pa. The cross-feed is adjustable to 0.0005-inch

THE Modern Tool Co., Erie, Pa., has added two new machines to its line of self-contained grinding apparatus. Typical views of the new machines are shown in the accompanying illustrations. All the operating levers are concentrated on the front of the machine, and no mechanism extends above the wheel stand. These machines are essentially manufacturing grinders for straight or taper cylindrical work in quantities, and their accessibility is said to allow the parts to be properly cared for without unnecessary expenditure of time.

The bed is a one-piece casting, braced to insure stability. The base rests upon three points, preventing cross strain, preserving the alignment and providing for irregularities in flooring.

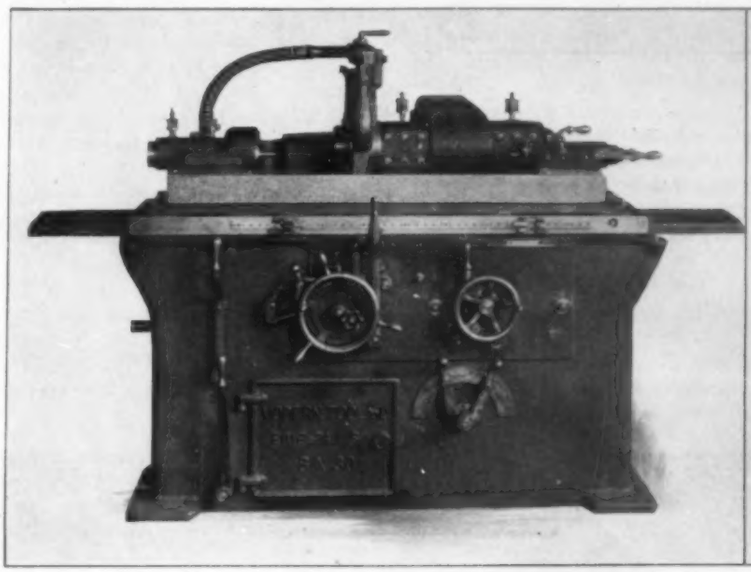
Spindle Details

The standard wheel spindle is 2¼ inches in diameter running in phosphor-bronze bearings 6¼ inches long. It is driven by a belt 4 inches wide. The design of the machine is such as to permit the use of a 3¼-inch wheel spindle for extra heavy work. In this case a 5-inch belt would be employed. The machine, which is shown above at the left, is equipped in this manner. The bearings in each instance are provided with sight-feed oilers.

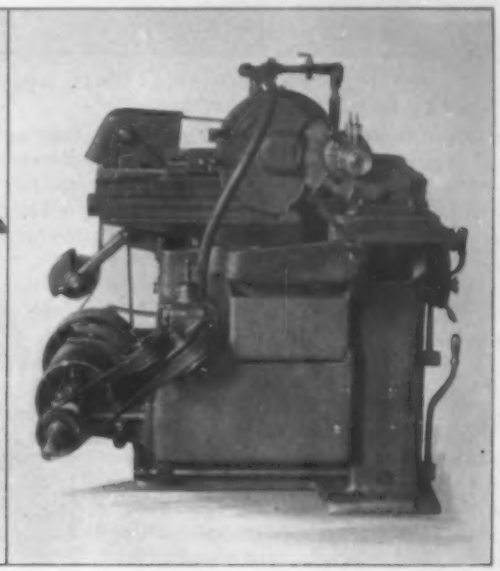
The wheel stand-pile is bolted to the bed of the machine. The wheel stand slides on V and flat ways. It is held in place by gravity, but is provided with a safety gib to guard against lifting under abnormal conditions. The wheel center which is of large diameter, has a long bearing on the spindle and will take any of the recognized standard grinding wheels. Wheels used on the standard machines are 16 inches diameter up to 3-inch face. The wheels used with the heavy drive are 18 inches diameter up to 4-inch face.

The table drive is of a very simplified type, eliminating what was formerly known as the table transmission. The drive now consists of a single unit contained in the bed of the machine. Steel spur gears are used for the reversing mechanism. The power table traverse is controled by a lever placed at the left of the table hand wheel. This provides for starting or stopping the table at any point in its stroke. When the table is under power, the hand wheel is automatically disengaged and when the power is removed the hand wheel is automatically engaged for traversing the table by hand. There are four table feeds, derived from a single unit gear box, and controled by a lever at the right immediately below the table hand wheel.

The automatic cross feed is positive in its action and has been simplified. It can be set for a reduction of any amount from 0.0005-inch to 0.005-inch at either or both ends of the table reverse. This latter feature is said to be especially advantageous when grinding against a shoulder. The feed is automatically thrown out when work is ground to size and a positive stop is provided for use when feeding by hand. The cross feed hand wheel is graduated in 0.0005-inch in plain view of the operator.



FRONT VIEW OF 8 x 30-INCH GRINDING MACHINE WITH 3¼-INCH SPINDLE



END VIEW OF 8 x 18-INCH MACHINE

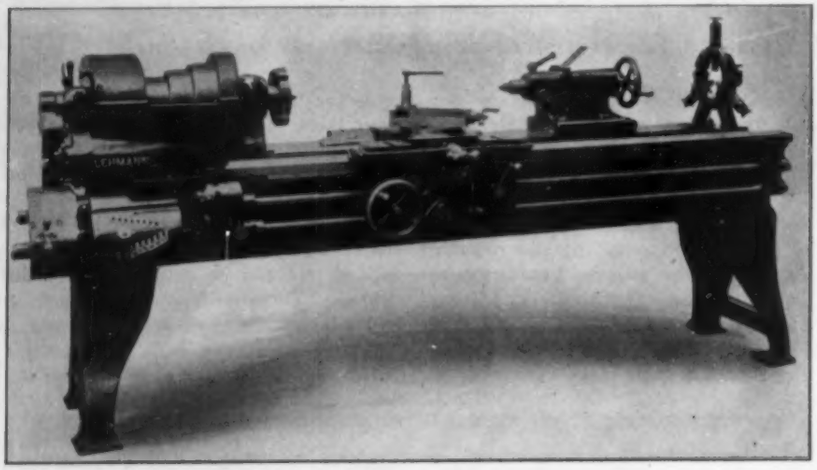
Live and Dead Centers

The head stock is provided with a combination of live and dead centers. The spindle is carried in bearings in the head stock base, in which it revolves for live center work. To change for dead center work it is merely necessary to loosen a screw which clamps the face plate to the spindle and tighten the clamp on the headstock which holds the spindle in the head stock base. The dead center pulley is then free to revolve

upon its bearing for work which requires the regular dead center.

The foot stock is fitted to the swivel table and preserves its alignment in the same manner as the headstock. The foot stock spindle may be held in any position by a spring, or may be set against the work and locked.

The pump is of the fan type and revolves in a horizontal plane. It is kept immersed so that it is constantly primed and no packing is required. The water tank is provided with settling pans which are accessible for cleaning.



LEHMANN IMPROVED ENGINE LATHE

Improved Lathe

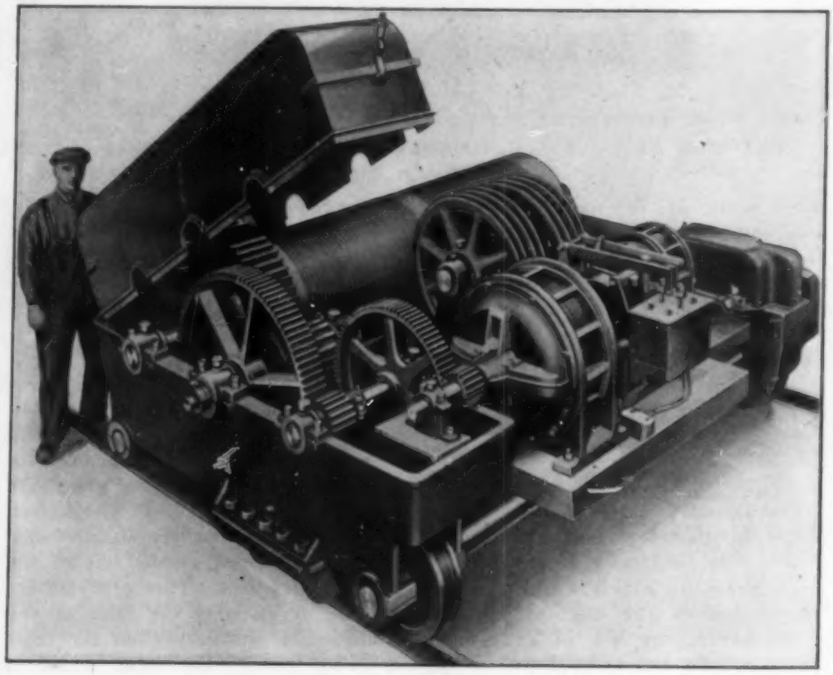
The Lehmann Machine Co., St. Louis, manufacturer of engine lathes and special machinery, has completed a 16-inch x 9-foot engine lathe of new design, which is said to embody several improvements. The designers have aimed to provide increased mechanical strength, together with speed and simplicity of operation. The headstock carries a wide-face, three-step cone pulley and double backgears which give a geometrical progression of nine speeds using one forward belt on the countershaft. Positive lubrication is provided for the phosphor-bronze bearings. End thrust is taken up by fibre in contact with steel washers. The bed has large Vs and is cut away at the extreme end to facilitate the removal of the tail stock and steady rest. The apron is rigidly supported by the carriage. A back plate gives double support to the running shafts. A bearing in the apron prevents the lead screw and feed rod from sagging. A safety device is supplied to prevent the engagement of the feed rod and lead screw at the same time. The parts of the half nut are connected with a link mechanism which is designed to reduce the lost motion to a minimum. The quick-change mechanism has a feature which is claimed to simplify the construction and double the range of application. The cone of gears has a sliding rocker arm provided with two central gears of different ratios together with an intermediate. All ordinary changes are made by moving the rocker arm. The lathe shown in the accompanying illustration has changes of thread from 2 to 112 per inch, with an equal number of feed changes. The lead screw has a ball thrust bearing.

The Peter A. Frasse & Co., New York, dealers in mechanics' tools, machinery, steel tubing and tool steel have issued a booklet entitled "One Century in Business". The text describes the establishment of the business a century ago by Henri F. Frasse, who figures in American history as builder of the model of Robert Fulton's steamboat, CLERMONT.

Large Crane Trolley for Locomotives

What is said to be one of the largest alternating current cranes ever installed has been furnished the Seaboard Air Line railway for its new shops at Portsmouth, Va., by the Whiting Foundry Equipment Co., Harvey, Ill. The crane is 160 tons capacity with two 80-ton trolleys, one of which is equipped with a 10-ton auxiliary hoist. The construction of the trolleys is shown in the accompanying illustration.

The entire train of gears, which is enclosed, runs in an oil bath. The motor pinion has an outboard bearing. The idler sheaves are mounted on a separator in place of being hung on, thereby allowing the operator to inspect the rope and oil the sheaves while standing on top of the trolley. This also increases lift of crane by about 30 inches. With the exception of the drum shaft, no shafts extend across the trolley. All shafts in the gear train are on the same line. The sides of the trolley and separator are cast steel. The housing is structural steel, provided with proper hand holes to allow for inspection and easy removal for making any occasional repairs.



TWO-MOTOR ELECTRIC CRANE TROLLEY, CAPACITY, 80 TONS, FURNISHED THE SEABOARD AIR LINE RAILWAY BY THE WHITING FOUNDRY EQUIPMENT CO.

WHAT'S WHAT and WHY

Don't Ask Yourself-Ask Us!

Questions from our Readers answered by Experts

Principle of Una-Flow Steam Engine

What is the principle underlying the operation of the una-flow engine?

Patents for the first engine embodying the principle of the flow of steam in but one direction through the cylinder were taken out in England as early as 1885, but the first successful engine was not built until 1909, when J. Stumpf, a German inventor, introduced a una-flow engine at Brunn, Austria. The engine met with success from the first and at the end of July, 1911, over 500,000 horsepower was being developed in una-flow engines in Europe. The use of this engine has spread to practically all lines of work and today the una-flow type is being used on locomotives, in marine service and for driving rolling mills. The development, however, has been closely confined to Europe, and only until the past few years have American manufacturers undertaken the construction of these engines. At the present time the Nordberg Mfg, Co., Milwaukee, is building two una-flow engines for the rolling mills of the Youngstown Sheet & Tube Co., Youngstown, O. These engines, when completed will represent the first large installation of the una-flow type in rolling mills in this country.

The cylinder of the una-flow engine differs from that of other steam engines in that the exhaust ports are at the center of the cylinder. Exhaust takes place when the piston is at approximately nine-tenths of its stroke. The live steam is admitted through poppet valves at the ends of the cylinder, and the heads are so designed that the steam before entering the cylinder passes through chambers in the heads, thereby jacketing them. This arrangement of the flow of steam reduces the losses usually caused by initial steam condensation, and it is to this feature that the engine owes its high efficiency. The una-flow engine, due to its capacity for wide temperature ranges, is able to carry expansion from boiler pressure down to condenser pressure without the necessity of compounding and with the same steam economy of a compound engine. The mechanical efficiency varies from 85 to 92 per cent. The principal advantage, however, lies in the fact that a great overload may be carried with only a scarcely noticeable increase in steam consumption.

Safety First Special

I have noticed that considerable interest is being manifested in a traveling exhibit of equipment designed to further personal safety. Will you please advice who is responsible for this exhibit and explain what it consists of and for what purpose it is being maintained.

The exhibit you refer to is the United States government safety first exhibit, which is being carried from city to city on a special train of 12 steel cars furnished by the Baltimore & Ohio railroad. The exhibit is maintained to acquaint the people of the United States with the various methods adopted by the federal govcrnment to further personal safety. The departments of the governernment participating in the exhibit are as follows: Treasury department, war department, department of the navy, department of the interior, department of agriculture, interstate commerce commission and American Red Cross Society. Apparatus used by the army, navy, coast guard, public health service, bureau of mines, reclamation service, forest service, weather bureau and national park service is exhibited. The interstate commerce commission display shows safety devices which are provided to protect railroad employes from danger.

Drills for Cutting Steel Samplings

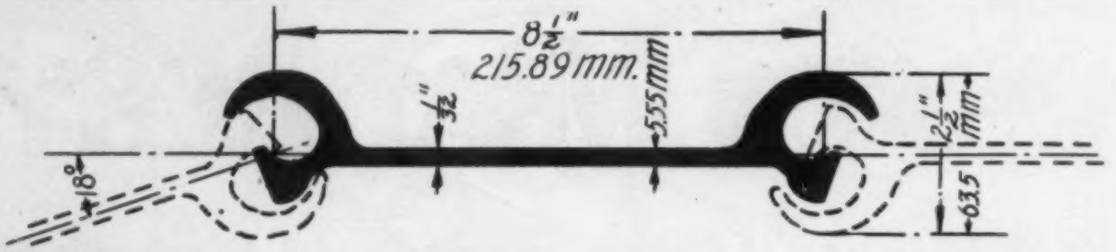
You will favor us by stating what you consider the best kind of drill to use for producing cuttings from steel test pieces.

A plain flat drill point made of high-speed steel with the cutting edges formed by grinding is about the best to use in making steel test cuttings. This style of drill can be made and sharpened easily on a medium-sized emery wheel, as no forging, heat treating, or skilled attention are necessary. Use stock about ¾ or ⅞ x ¼ or 5/16-inch. Order it in 6-inch or 8-inch lengths, preferably sawed from the bar, as the nicking and breaking-off method is liable to injure the structure of the steel. Grind the two cutting edges to equal lengths, with a slope from the center of about 30 degrees. Give a clearance of 5 degrees or so back of the cutting edges. This form of drill point will produce cuttings that can be quickly crushed to 80 mesh in a mortar with an air hammer plunger. Use a drilling machine socket or chuck that will hold the drill stock without change from its original form.

Removal of Metalloids

When puddling pig iron, are the silicon and carbon oxidized by the gases in the furnace or are they carried out by the slag? If both reactions take place, please give us the approximate percentage removed in each manner. Is any of the sulphur, phosphorus and manganese eliminated by oxidation, or is it carried out by the slag? Also, in puddling a charge of 550 pounds of pig iron, what in general practice is the maximum percentage of phosphorus and sulphur which the charge may contain in order that the muck bar may be under 0.10 per cent phosphorus and 0.015 per cent sulphur?

In the puddling process the silicon is oxidized after the pig iron is melted.



WEIGHT		TRANSVERSE STRENGTH	MODULUS OF SECTION		Least Radius of Gyration
Lbs. Per Sq. Ft.	Lbs. Per Lin. Ft.	Per Single Section	Per Inch of Width	Average Section Modulus per Horizontal Foot of Wall Interlocked in Place	
20.75	14.698	1.100 In.³	0.1294 In.³	1.553 In.³	0.509 In.
Per Sq. Meter in Kilogs.	Per Lin. Meter in Kilogs.	Per Single Section	Per Centimeter of Width	Average Section Module per Horizontal Meter of Wall Interlocked in Place	Least Radius of Gyration
101.314	21.873	18.024 Cm.³	0.835 Cm.³	83.478 Cm.³	1.293 Cm.

NEW LACKAWANNA PILE AND TABLE OF PROPERTIES

It is oxidized by the oxygen in the slag and combines with the slag, forming $FeOSiO_2$. This is the first reaction that takes place. The carbon is oxidized by the oxygen contained in the roll scale charged into the furnace. The gas resulting from the addition of roll scale, carbon monoxide, CO, rises to the surface of the bath and goes up the stack. This is the cause of the high boil.

Answering your second question, the manganese, sulphur and phosphorus are all eliminated by oxidation. All of the manganese and phosphorus and most of the sulphur are retained, however, in the slag. The maximum percentage of phosphorus and sulphur which the puddling charge may contain in order to produce muck bar under 0.10 per cent phosphorus and 0.015 per cent sulphur depends on the basicity of the cinder and the working temperature of the furnace.

New Portable Pulmotor

The Draeger Oxygen Apparatus Co., Pittsburgh, has developed a new valve for portable, hand-operated pulmotors which is said to control the air pressures producing inhalation or exhalation of the patient's lungs. The pressure control valve is in the hands of the operator, who is at the patient's head—not at the pump. The operator moves the lever back and forth to obtain uniform inhalation and exhalation, timing these with his own breathing. The man at the pump produces only the amount of air desired by the operator and maintains this by occasional strokes, as necessary. A pressure once obtained is maintained until the operator releases it. Indicating gages located near the valve show the first symptoms of the return of natural respiration to the patient and enable the operator to time his efforts with the patient's breathing.

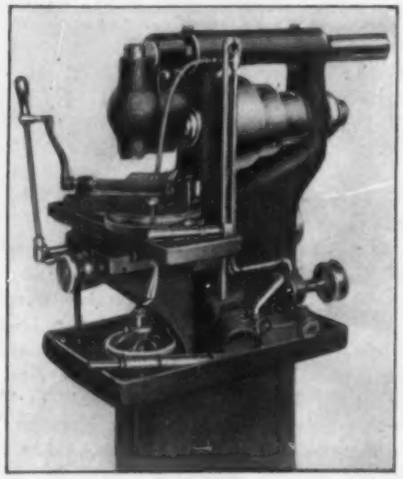
Lackawanna Section

The Lackawanna Steel Co., Buffalo, N. Y., has just designed a new 8½-inch section of straight-web steel sheet piling. The pile and table of properties is shown in the accompanying illustration.

This section is of the standard Lackawanna type with interlock consisting of similar hooks and guards on both edges. It is designed for use where a comparatively light section is required with high transverse strength and minimum weight, such as medium trench and cofferdam work.

The interlocked joint formed between adjacent piles is flexible through an arc of 18 degrees on each side of the center plane of the piling section. The hooks of adjacent sections engage to offer the greatest resistance to longitudinal displacement. The guards overlap and engage the outer surface of the hooks on the adjacent sections, thus preventing lateral displacement and cooperating to prevent longitudinal displacement. The joint can be disengaged only by withdrawing one pile. There are three lines of contact between the interlocked members of each joint. This gives a positive, double, and close interlock, yet with a minimum of friction in driving or withdrawing. Ample opportunity is afforded for displaced material to work into the joint and assist in rendering it watertight, while at the same time the interlock holds the piling in proper alignment to form the wall.

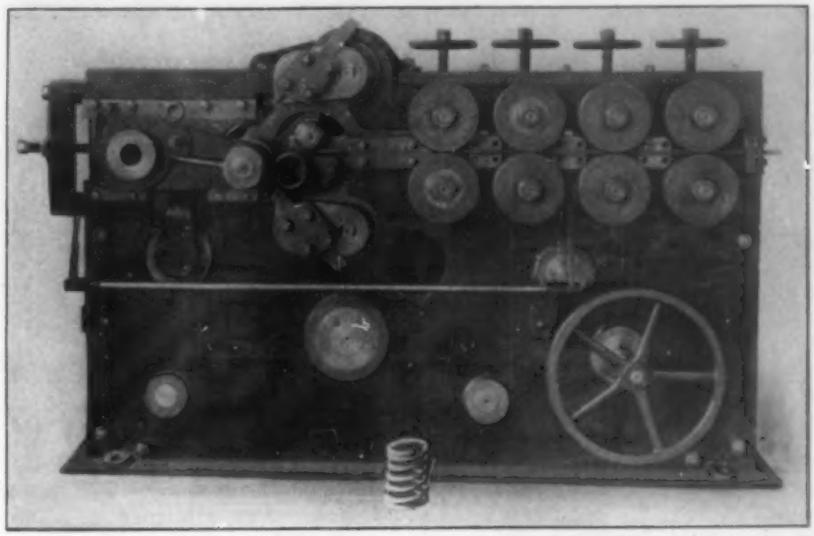
In the development of this new section, special attention was given to secure for this joint high tensional and transverse strength, and at the same time to produce a pile which would have comparatively low weight per square foot. The section is of simple construction and the material is so distributed as to give a high section modulus per lineal unit of wall.



HORIZONTAL AND VERTICAL MILLER

New Milling Machine

The Bickford Machine Co., Greenfield, Mass., has placed on the market a combined horizontal and vertical milling machine, which has the characteristics of a medium weight power-feed miller with the added advantage of hand feed for light work. The rack used for the table feed is a quarter section of a screw driven by a worm gear. This method is believed to reduce the chatter and backlash. The vertical attachment furnished with the machine has a spindle running in phosphor-bronze bearings and is bored for a No. 9 B. & S. taper. The spindle is driven by steel gears en-



HIGH-SPEED, COLD-WIRE COILING MACHINE

gaging with a drive shaft which enters the main spindle of the miller. A weight is provided to return the table to its position when it is not desirable to allow the cutter to run over the work after the feed has stopped. A geared oil pump attached to the rear of the machine forces the lubricant from the supply tank in the machine case over the cutters. The machine is shown in the accompanying illustration.

Wire Coiling Machine

Sleeper & Hartley, Inc., Worcester, Mass., designers and builders of high-speed, automatic wire-coiling machines, have completed a cold-wire coiling machine which will handle 5/8-inch, oil-tempered wire at a speed of approximately 50 feet per minute. The machine occupies a 6 x 8-foot floor space and weighs 15,000 pounds. The new wire coiler concludes a series of spring coilers designed by Mr. Sleeper. Instead of winding the spring on an arbor, this coiler, like the smaller machines, involves the unusual feature of forming the springs by feeding the wire through rolls which force it against a forming point or deflector. This arrangement is shown in the accompanying illustration. The only function of the arbor is to provide a cutting edge for shearing the wire after the coil is completed.

This machine is fitted with adjustments which are designed to feed a predetermined amount of wire into a spring. These adjustments are claimed to permit rapid changes of the diameter, pitch and contour of the spring. The diameter and contour adjusting mechanism is controled by cams, one being used to produce taper springs and two being used to form a variety of barrel-shaped springs. The pitch adjustment permits the formation of squared ends on the springs, thus eliminating the necessity for squaring the ends by heating and pressing after the spring has been taken from the machine.

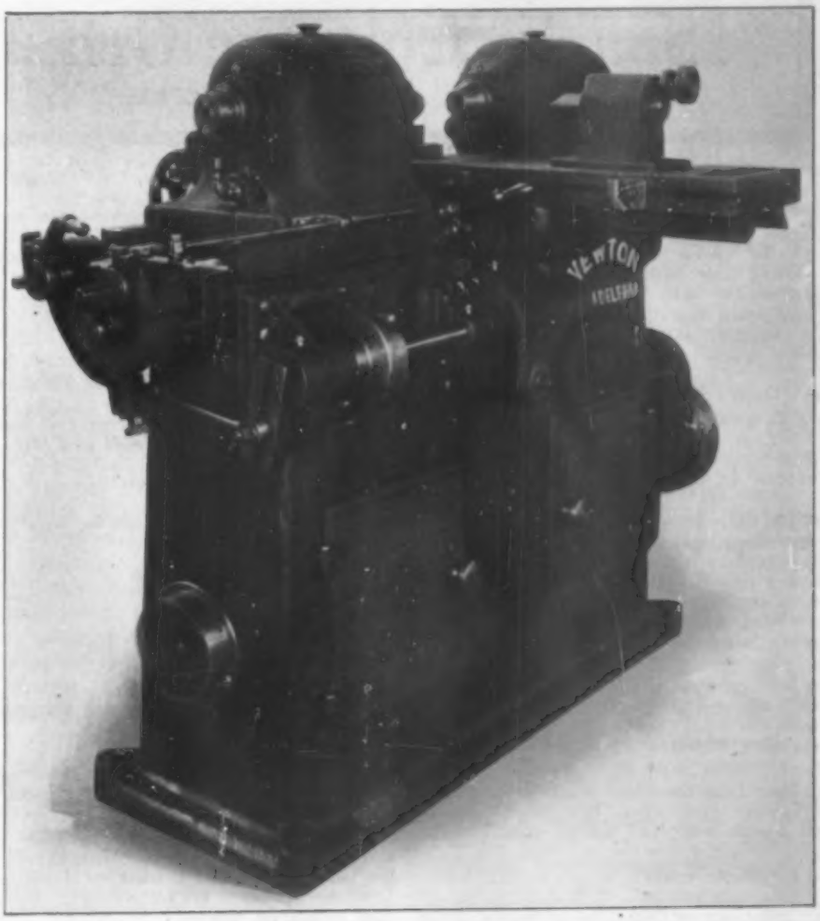
The Heinle Co., Pittsburgh, has issued a set of charts covering the rolling of guide-squares, guide-rounds, hand-rounds and hexagons. It is said that each chart discloses a positive method for rolling each shape, besides indicating the complete progressive conformation of the metal. Instructions also are given covering turning and dressing the rolls.

Key-Seating Machine

A new type of duplex keyseat milling and cottering machine has recently been designed by the Newton Machine Tool Works, Philadelphia. It is claimed that it not only increases the production, but that it eliminates the time lost in laying out the work, where two keyseats are cut in opposite sides of a shaft. The machine is shown below.

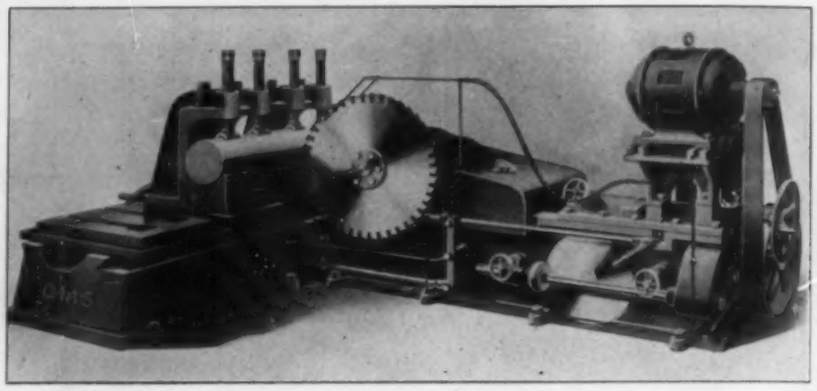
The spindles have double taper bearings, and the spindle heads have automatic feed with safety release for cottering. The maximum feed per stroke of table is 1/16 inch. The spindles have four changes of geared speeds without removal of gears in addition to back gears on each head giving a speed range from 300 to 1,465 revolutions per minute with eight changes.

The single step driving pulley is 10 inches in diameter, with a 2¼-inch face and runs at 735 revolutions per minute. Drums 12 inches in diameter and 8-inch



NEW KEYSEAT MILLING AND COTTERING MACHINE

face are mounted on the driving pulley shaft, inside the base connecting by belt to the spindles on which the back gears are located. High spindle speeds are obtained by the open belt and the slow spindle speeds through back gears. The work table or cross carriage is 44 inches long over all and 38½ inches over finished surface. It is 9 inches wide and has three changes of feed, either continuous for long splines or automatic reversing for cottering. The maximum diameter of shaft on which it is intended the machine shall operate is 4 inches and the speeds and feeds are suitable for keyseats from ⅛ inch to ¾ inch wide, inclusive.



HIGH DUTY COLD METAL SAW

Cold Metal Saw

The Vulcan Engineering Sales Co., Chicago, has developed a new type of high-duty, cold metal sawing machine which is said to embody several improvements. The saw and gear arbors are made of high-carbon, open-hearth steel and are fitted by scraping. The backlash and chatter of the saw blade is claimed to be minimized by the staggered teeth which are cut from solid metal. The main bearings are bronze. The main worm is steel and the worm wheel consists of a bronze rim mounted on a steel hub. The end thrust is taken up by roller bearings. The entire mechanism is encased and operates in grease.

The feed is accomplished by a combination of a friction disc and gears as shown in the accompanying illustration. The feed provides a range from 5/16-inch to 2½ inches per minute. The friction disc is said to sustain automatically the proper contact with the friction wheel to insure the transmission of maximum power. This method of feed control is believed to be very flexible and to allow rapid adjustment of the feed. Machines are furnished with peripheral speeds of 30 and 50 or 40 and 60 feet per minute. One of the new features announced by the builders is the concentrated control of the feed, peripheral speed and power return. An oil trough is cast around the work table and an oil pump provided for forcing the lubricant through pipes to the saw.

Sparks from the Grinding Wheel

By H. O. Tair

THAT "telegraph your senator and congressman" movement which flooded Washington with messages from hyphenated individuals—they cannot be called hyphenated Americans—showed how widespread one great misconception really is. They probably will soon learn that the AMERICAN HOUSE at Washington is not run on the "European" plan.

* * *

A "Daily" Truism for a Year or More

We gleam from a recent issue of *The Daily Iron Trade and Metal Market Report* that, "Nobody knows what may happen in the Senate."

* * *

The country's imports for March of this year aggregated $214,000,000, while the exports totaled $410,000,000. Isn't it about time for this greatest of all business institutions to be placed in charge of men with back-bone instead of so much jaw-bone?

* * *

It would seem as if Verdun were only doomed to become the greatest and most fruitful field for the shell reclaiming expert.

* * *

Heard in the sand blast department: "Nobody ever says 'His name's mud,' of a man who has lots of sand."

* * *

Headlines noted:
"Molders scarce."
"Shortage of molders produces acute situation."
"Orders piling up, not enough molders."

Won't somebody please promote a society for the promulgation of aesthetic appeals to popularize molding apprenticeships?

* * *

The captain on the heaving deck,
Saw far away a tiny speck.
He shouted loud "Full speed ahead—
'Less we drop that, we'll all be dead.

* * *

We read in three columns of one page of *The Daily Iron Trade and Metal Market Report* recently:
"Scrap back on January basis"
"The local scrap"
"Some abnormally high prices for scrap"
"This grade of scrap"
"Other grades of scrap"
"Support the scrap"
"The future of scrap"
"Chicago scrap declines"
"Why scrap is dull"
"Analyze the scrap"
"Ordinary scrap".

Does anybody now say we are not belligerent in this country?

* * *

The orders that are being divorced from across the ocean, sure are bringin' in "Allymoney."

* * *

"Inquiries for shell steel continue to ruffle the surface of the market" (Headline from an esteemed contemporary). Such steel must be destined to become torpedoes.

Russia is placing large orders for barb wire. Apparently the names found in her war reports are not sufficiently embroiling.

* * *

A market report has it that bar iron is steady on small demand. Wait until the agitators and investigators who want to put everybody behind the bars get their breath. They'll see to the increasing of the demand all right.

* * *

German submarines are now "equipped" with white mice to warn the crew of the presence of impure air. If they fitted up the "Zeps" and "planes" with certain white birds would it indicate a seeking after pure air?

* * *

The cartoonist for this column is away on a vacation or we would have him draw a picture of the peekiest peekaboo "waste" to represent that $11,000,000 armor plate plant disposal.

* * *

The Tata Iron & Steel Co., Sakchi, India, is to make enlargements to cost seven and a half millions. Preparing they are to say "Ta ta" to the dollars as well as the shells they are making for the allies.

* * *

If the clothing and shoe manufacturers of the country can produce headgear, footgear and clothing to outfit an army of 3,000,000 in 90 days, recruit No. 2,999,999 would incite our pity at the end of his wait.

Testing Society's Prestige Growing

Proceedings of Nineteenth Annual Meeting Cover Wide Field—Specifications Translated Into Spanish—Many New Standards Adopted

CONSTANTLY growing in prestige and continually expanding its sphere of influence, the American Society for Testing Materials now promises to become an important factor in extending the export trade of the United States in products covered by its many standard specifications. At the nineteenth annual meeting of this organization, held at the Hotel Traymore, Atlantic City, June 27 to 30, it was announced that the United States Department of Commerce is having 62 of the society's standards translated into foreign languages which will be distributed free of cost by the consular offices. The first translations are being made into Spanish for the early circulation of these specifications in Latin-American countries, and these will be followed by translations into French, Portuguese and Russian. By its approval of a measure now before congress providing for the centigrade scale of temperature readings in all government documents, in place of Fahrenheit, the society, for the first time in its history went on record regarding legislation of any kind, whether national or state. This measure, strongly endorsed by government engineers, if passed, is considered by manufacturers to be the entering wedge which subsequently may lead to the adoption of the entire metric system.

For several years, definition of the term elastic limit, with its correlated physical designations, proportional limit and yield point, has been the subject of considerable discussion and four papers, constituting a symposium on this subject, were presented at this meeting. These were of an exceedingly technical nature, inclined toward the ultra-refinements of testing. No change, however, was made in the definition of the term and its application in the standard specifications. It was pointed out that probably only designing engineers are interested in the split-hair differences referred to in the discussions, but for the society's standards it is necessary to view the situation from a commercial standpoint.

The growth in membership reported by Secretary Edgar Marburg was particularly gratifying, 2,071 firms and individuals now being enrolled as compared with 1,842 last year, a net increase of 229. The registration also set a new high mark, representing an attendance of 516. This is an increase of 27 over the attendance in 1915, which was 489.

The report of the committee on steel, presented by C. D. Young, engineer of tests of the Pennsylvania Railroad Co., chairman, recommended the revision of 17 specifications, the adoption of seven specifications previously submitted in tentative form, and six new standards. The work of this committee, which consists of 97 members, is now conducted by 16 sub-committees. The report submitted to the society, as usual, was voluminous and covered 100 printed pages.

Revisions in the following specifications were recommended: "Structural Steel for Bridges," "Structural Nickel Steel," "Structural Steel for Buildings," "Structural Steel for Locomotives," "Structural Steel for Cars," "Structural Steel for Ships," "Carbon Steel Bars for Railway Springs," "Carbon Steel and Alloy Steel Forgings," "Quenched and Tempered Carbon Steel Axles, Shafts and Other Forgings for Locomotives and Cars," "Carbon Steel Forgings for Locomotives," "Cold Rolled Steel Axles," "Steel Castings," "Lap-Welded and Seamless Steel Boiler Tubes, Safe Ends and Arch Tubes," "Boiler and Firebox Steel," "Wrought Solid Carbon Steel Wheels for Steam Railway Service," "Wrought Solid Carbon Steel Wheels for Electric Railway Service" and "Steel Tires."

The following seven specifications were referred to letter ballot of the society for adoption as standards: "Carbon Steel Bars for Vehicle and Automobile Springs," "Silica-manganese Steel Bars for Automobile and Railway Springs," "Chrome-vanadium Steel Bars for Automobile and Railway Springs," "Helical Springs for Railways," "Elliptical Springs for Railways," "Alloy Steel Forgings" and "Quenched and Tempered Alloy Steel Axles, Shafts and Other Forgings for Locomotives and Cars."

Proposed Specifications

The following six proposed tentative specifications were ordered published in the Year Book of the society: "Steel Track Spikes," "Steel Screw Spikes," "Steel Tie Plates," "Carbon Steel Bars for Railway Springs for Special Silicon Requirements," "Elliptical Springs for Automobiles" and "Boiler and Firebox Steel for Stationary Service."

In co-operation with the Association of American Steel Manufacturers, the committee on steel considered the question of permissible variations in weight and thickness of sheared plates, using as a basis the tables prepared by the manufacturers and submitted in 1914. Two tables were presented covering the permissible variations of plates ordered to weight and the permissible overweight of plates ordered to thickness. The changes were passed to letter ballot and the tables will be submitted for adoption to the members of the Association of American Steel Manufacturers. One of the changes provides that when plates are ordered to thickness, the cross-section of each plate shall not vary more than 0.01 inch under that ordered. The tensile strength of rivet steel in the specification for structural steel for cars was changed from 48,000-58,000 pounds per square inch to 45,000-60,000 pounds per square inch.

In the structural steel specifications, including those for bridges, buildings, locomotives, cars, ships and for structural nickel steel, the requirements as to permissible variations in weight and thickness were changed to read as follows: "The cross-section of weight of each piece of steel shall not vary more than 2.5 per cent from that specified; except in the case of sheared plates, which shall be covered by specifications given in two tables submitted and previously referred to. One cubic inch of rolled steel is assumed to weigh 0.2833 pound."

Members of the sub-committee on structural steel conferred with representatives of the Master Car Builders' Association with a view of harmonizing conflicting requirements in the specifications of that association and of the society relating to rivet steel for cars. The Master Car Builders' committee already had recommended that its specifications be amended as to chemical requirements and number of tests to agree with those of the American Society for Testing Materials, while the latter's specification for structural steel for cars was changed to conform to that of the Master Car Builders, which is 45,000 to 60,000 pounds per square inch.

It was recommended that requirements as to permissible variations in

the dimensions of bars for vehicle and automobile springs be left subject to agreement between the manufacturer and purchaser, pending further consideration of this question by the committee.

The committee recommended that requirements as to permissible variation in dimensions for all bars, including bars for railway springs, be subject to agreement between the manufacturer and the purchaser. The tentative specifications for carbon steel bars for vehicle and automobile springs were referred to letter ballot for adoption as a standard. The tentative specifications for helical and elliptical springs for railways, submitted last year, have been divided into two separate specifications, namely, one for helical and one for elliptical springs. The substance of these specifications has not been changed and they were referred to letter ballot for adoption. The tentative specifications for elliptical springs for automobiles are based upon those under consideration by the Society of Automobile Engineers.

Specifications for Steel Forgings

The sub-committee on steel forgings made revisions in four standard specifications and two tentative specifications. Three of the forging specifications contain requirements involving the determination of the crystalline nature of a fracture of a tension test specimen, and "crystalline" for the purpose of these specifications has been defined as follows: "The fracture shall be considered crystalline if the crystals which it contains are so large that the cleavage planes or sides of these crystals are easily visible to the eye."

The committee has under consideration, in co-operation with the Master Car Builders' Association, the revision of the drop test requirement for car and tender axles. The proposed revisions of these requirements, based on the use of a 2,240-pound tup instead of a 1,640-pound tup as at present, have been prepared and the new test data are being accumulated for consideration by the committee during the ensuing year.

Rolled Steel Wheels

The three specifications for rolled steel wheels and for steel tires, suggested by the committee, were referred to letter ballot for adoption. Extensive changes in substance were made in the tire specifications. Requirements as to carbon content for each of the three classes of tires have been inserted as follows: Class A, 0.50 to 0.70 per cent; Class B, 0.60 to 0.80 per cent; Class C, 0.70 to 0.85 per cent. The requirement as to silicon has been changed from not over 0.35 per cent to 0.15-0.35 per cent. It also is required, that check analysis by the purchaser shall show all of the specified chemical elements to meet the requirements, instead of phosphorous and sulphur only, as in the present specifications. The drop test has been omitted and the tension test is required only if specified by the purchaser. The tension test specimen is taken from an ingot representing each melt. If this specimen fails to conform to the requirements, a second specimen, taken from a tire from that melt, furnished at the expense of the manufacturer, may be tested. Permissible variations in inside diameter have been modified to always permit a variation of ¼-inch less than the diameter specified. The following permissible variations in outside diameter have been inserted: For tires 54 inches or under in diameter, ½-inch or over; for tires over 54 inches in diameter, ⅛-inch under and ⅜-inch over the specified diameter.

Numerous revisions were made in the standard specifications for steel castings. Regarding the annealing of class B castings the following paragraph was inserted: "Class B castings shall be properly annealed, the treatment depending upon the design and chemical composition of the castings." The requirements as to yield point for all grades of castings was changed to 45 per cent of the tensile strength.

The standard specifications for lap-welded and seamless steel boiler tubes, safe ends and arch tubes, were revised to include requirements for superheater pipes. In their amended form, these specifications agree with those to be recommended for adoption by the Master Car Builders' and Master Mechanics' Associations.

Boiler and Firebox Steel

In view of the late changes made in the specifications for boiler and firebox steel not noted in the general report of the committee on steel, it was suggested that these changes be adopted as tentative, but when referred to a vote, this action was not favored and the changes agreed upon at the meeting of the committee on Monday, June 26, were adopted and the entire specification as revised was referred to letter ballot. The changes refer to the match-marking of plates so that the test specimens representing them may be identified. When more than one plate is sheared from a single slab or ingot, each shall be match-marked so that they may be identified with the test specimens representing them. Also, each match-mark shall consist of two overlapping circles not less than 1½ inches in diameter, placed upon the shear lines, and made by separate impressions of a single circle steel die. The specifications for boiler and firebox steel for stationary service were adopted for publication as tentative. The presentation of these specifications resulted from the consideration of the question of revising them to agree with the provisions of the boiler code of the American Society of Mechanical Engineers.

Reporting Chemical Composition

The sub-committee on methods of chemical analysis recommended the following order for reporting the chemical composition of steel: Carbon, manganese, phosphorous, sulphur, silicon, copper, nickel and chromium. It further recommended that percentages of carbon, manganese and silicon be reported to two decimal places, and percentages of phosphorous and sulphur to three decimal places. The committee has requested the co-operation of the Association of American Steel Manufacturers in extending the use of these practices.

The progress reported by J. R. Cain and H. S. Rawdon of the United States Bureau of Standards on "Test Ingots for Ladle Analysis" was published in the June 29 issue of *The Iron Trade Review.*

A number of important changes were recommended tentatively in the standard tests for magnetic properties of iron and steel. In sampling, each mill heat or lot shall be marked separately, the test samples to consist of one test specimen from each of six different bars. The heat treatment for steels containing carbon, 0.50 to 0.70 per cent; manganese, 0.50 to 1 per cent; phosphorus, 0.05 per cent; sulphur, 0.03 per cent and silicon, 0.10 per cent, shall consist of heating the specimen to 825 degrees Cent. and quenching in water at 20 degrees Cent. Tungsten steel shall be heated to 845 degrees Cent. and quenched in water at 20 degrees Cent. The heat treatment for other alloy steels is to be determined by practical tests on the test specimen. The test specimen shall not be allowed to cool more than 10 degrees after leaving the furnace and before immersion.

Progress in Rail Practice

A review of progress in rail manufacture was the subject of a report presented by the committee on steel. Research work is directed toward the elimination of failures commonly associated with segregation and the elimination of failures by transverse fissures. It is the prevailing opinion that split and mashed heads generally are associated with segregation and a number of tests have been proposed which will permit the detection of this condition. The estimation of segregation from

the appearance of the fracture is claimed to be much affected by the personal equation of the inspector and is not of such a positive character as to permit of an absolute check in case of disagreement between the manufacturer and the railroad.

Transverse Fissures

Failures due to transverse fissures are not as clearly understood as the other principal types. Theories advanced for this type of failure vary from included foreign matter in combination with high chemical hardeners and internal stresses, to possible checks from cooling or from cold-straightening. While the initial cause of the fracture is unknown, it is generally agreed that the development of the fracture to the point of final breakdown of the section is due to repeated loading, causing deflection upon the rail. Some engineers, however, attribute this type of failure to the action of heavy wheel loads and the stress produced in a rail by the cold rolling of the surface under traffic in combination with some unknown condition in the steel.

The report of the committee on cast iron and finished castings was presented by Dr. Richard Moldenke, chairman. During the year the sub-committee on car wheels has been engaged in revising the standard specifications for cast iron car wheels, two meetings having been held, but since the work is not completed, no report will be made until next year. The committee reported a general demand for specifications for cast iron soil pipe and fittings. Manufacturers and consumers are realizing that there are too many minor variances in a product which should be as much subject to standardization as the material for water distribution systems. Tentative specifications already have been drawn which have been circulated among the members of the committees competent to pass upon them, although no report will be submitted until next year.

The present tentative specifications for foundry coke were referred to letter ballot of the society for adoption as standard, and proposed tentative methods for sampling and analysis of coke were submitted for printing in the 1916 Year-Book as an addendum to the standard specifications.

Specifications Translated

Each standard translated into a foreign language as mentioned at the outset of this report, will carry an introductory statement in the foreign language covering briefly the history of the society and the regulations governing the preparation and adoption of standards. A similar statement will be published in the English language and the standard will be reprinted in both the foreign and the English language. The distribution of the standards will be made through the consular offices free of cost. The specifications first will be translated into Spanish and French, but the question of translating them into Portuguese and Russian has not been definitely determined. Thus far the translations have been limited to the Spanish language, since the funds available to July 1, apply only to the development of South American trade. For a number of years government aid in the form of large appropriations has been accorded the British Testing Society and it is hoped that the action of the United States department of commerce will be the forerunner of government co-operation in the dissemination of American standard specifications to foster export trade.

In view of criticism on the part of both producers and consumers that the standards of the society are subject to too frequent changes and that this not only is undesirable from the standpoint of the users in this country, particularly so in view of their translation in foreign languages, it was decided that the Year-Book containing the standard specifications be published biennially in the even years hereafter and, therefore, the volume following that of 1916 will be published in 1918.

Would Amend By-laws

A proposed amendment to the by-laws, which was referred to letter ballot, provides that reports, resolutions and recommendations pertaining to or involving the use, or proposed use, in a standard or tentative standard, of any device or process which forms the subject matter of any existing patents, first shall be submitted to the executive committee and shall be reported to the society only with the approval of the executive committee.

Past-president A. W. Gibbs, was appointed representative of the American Society for Testing Material on a committee that has been created for the purpose of establishing a suitable memorial to the late Dr. Joseph A. Holmes, who died on June 13, 1915. At the time of his death, Dr. Holmes was director of the United States bureau of mines and held membership in the society since 1913.

An exceedingly valuable contribution to the science of hardening and tempering carbon steel with subsequent scleroscope hardness tests was made by Dr. Henry M. Howe and Arthur G. Levy. The steel upon which the tests were made contained 0.92 per cent carbon, and the analysis of the other elements follows: Silicon, 0.14 per cent; manganese, 0.123 per cent; phosphorus, 0.009 per cent, and sulphur, 0.011 per cent. The investigation showed that if this steel is heated to 800 degrees Cent., and quenched immediately or after slow-cooling to one or another of a descending series of temperatures, the volume of the quenched steel decreases progressively as the quenching temperature sinks toward the recalescence temperature, indicating that the arrest of the transformation by the quenching becomes progressively less complete. The microstructural changes caused by variations in quenching temperature and by tempering were illustrated and discussed. An interesting summary of the influence of time and temperature on the oxide colors found in the tempering cracks was presented, the colors being deeper as the tempering at a given temperature is increased. One section of the paper was devoted to the hardness tests of the samples of steel which formed the basis of this investigation.

Recrystallization of Boiler Tubes

"Recrystallization as a Factor in the Failure of Boiler Tubes," was the subject of an extensive investigation made by A. E. White and H. F. Wood, to show the cause of frequent replacements of tubes in central station boilers operated at high rates of evaporation. The investigation has made possible the formulation of an hypothesis giving the time-temperature relationship affecting crystal growth in deformed, low carbon steel at temperatures lying between 675 and 550 degrees Cent. For instance, heatings for eight minutes at 675 degrees Cent. and for nearly 35 hours at 550 degrees Cent., respectively, will be required before a noticeable beginning of crystal growth in previously deformed low carbon steel could be detected. The formation of coarse crystals due to the high temperatures to which the tubes were subjected produced a marked deterioration of the metal and contributed toward the trouble referred to as "bagging".

High Carbon Recommended

To produce a tube metal that will not be so subject to the formation of coarse crystals, a higher carbon content is recommended and tubes made of higher carbon steel than now generally employed are being tried. C. F. Hirshfeld, of the Detroit Edison Co., pointed out that in recent years large central power stations carry the peak loads with boiler capacities that apparently are too low for such loads. This is made possible by the installation of improved types of stokers, greatly increasing the amount of coal fired. This has subjected the boiler tubes to increased temperatures and to conditions different than those maintaining when they were originally installed. In Detroit Mr. Hirshfeld said that unusually pure

water is available for boiler purposes, yet notwithstanding this fact an egg shell scale forms on the tubes. It is the contention of practical boilermakers that as long as the flues are kept clean no difficulties will be experienced, but this does not seem to be the case under the present intensive system of firing. Furthermore, some plants are being built in which the boilers will be subjected to a much higher rate of firing than has been tried heretofore and the United States Navy Department has solved the problem of this high pressure firing by the use of nickel steel tubes. Referring to the specifications formulated by the society he stated that practically all of them are built on superstition, their foundation resting on insecure grounds. Mr. Hirshfeld said that this applies particularly to the boiler specifications which provide a standard for conditions that do not prevail today in large central stations.

F. N. Speller, of the National Tube Co., Pittsburgh, asked for information regarding the depth of the recrystallization of the tube specimens tested and he was informed by Prof. White that it was about ⅛-inch. The latter stated that all tubes which bagged were coarsely crystalline on the fire side or contained cavities and blow-holes on the water side. He added that no difficulty has been experienced in inserting tubes of a high carbon content into the tube sheets.

Heat-treated Axles

The paper presented by C. D. Young entitled "Heat Treatment of Carbon Steel Locomotive Axles: Water versus Oil Quenching," aroused considerable interest. This paper was published in June 29 issue of *The Iron Trade Review*. The author discussed the characteristic physical properties of a carbon steel forging resulting from water quenching and oil quenching. It has been the general observation that a water-quenched carbon steel forging will have a higher tensile strength and greater reduction of area for the same elongation than a similar forging which has been oil-quenched. This, however, has not been borne out consistently by these tests except as to elastic limit.

Forgings having imperfection such as segregation, forging cracks, etc., generally are made useless by cracking during water quenching to a greater extent than in oil quenching. This peculiar property of water quenching, therefore, increases the assurance of having only sound material plates in service.

Dr. Henry M. Howe pointed out that Mr. Young's paper directed attention to the chief aim of most heat treatments, namely, structural fineness. A drawing temperature as high as 635 degrees Cent. was questioned and Dr. Howe believed that this should exceed 400 degrees by only enough to reduce the quenching stresses to harmlessness, or rather to reduce them until the benefit from their further removal ceases to equal the harm done by the accompanying increase of coalescence. If, for example, the quenching stresses become harmless on drawing at 500 degrees, then this is the proper drawing temperature. Should this leave the strength too great and the ductility too small it would seem more advisable to get the needed weakening and ductility through a smaller carbon content in the steel than through a higher drawing temperature.

A Steelmaker's Viewpoint

Dr. J. S. Unger, manager of the central research bureau of the Carnegie Steel Co., Pittsburgh, presented a written discussion of Mr. Young's investigation. He directed attention to the fact that as the carbon in steel increases it becomes more sensitive to rapid thermal changes, and he added that it is practically impossible to water-quench a 10-inch hollow axle containing 1 per cent carbon without breaking it into several pieces. Dr. Unger stated that small articles of high carbon steel, such as tools, saws, etc., which must be hard, are quenched in oil since rapid cooling in water will induce strains that will rupture the material. No large forgings containing from 0.55 to 0.60 per cent carbon are ever quenched in water.

In making a comparative test of the kind reported upon by Dr. Young, Dr. Unger pointed to the necessity of eliminating every factor which might influence the results with the exception of the quenching medium. The axles should have been rolled from the same ingot and as nearly as possible from the same location in the ingot. Since this is impossible, however, he suggested that the axle should have been cut transversely at the center and each half treated at the same time and in the same furnace. That the oil used for quenching was a factor of importance not reported by Mr. Young also was contended by Dr. Unger who stated that animal and mineral oils have shown differences in the hardness of about 15 per cent of the same steel quenched in them.

In conclusion Dr. Unger stated that the results do not prove the superior qualities of one axle over the other, nor has it been shown that a segregated, water-quenched axle will crack, and to make a test of one axle of each kind and imply that water quenching should be adopted is sweeping in character and hardly is borne out by the evidence presented by Mr. Young. R. P. Devries, of the United States bureau of standards, noted that the differences in the mechanical properties of the axle quenched in water and oil appeared to be very small. This he assumed to be the result of the high drawing temperatures employed. He added that the results indicate that re-heating an oil-quenched specimen to a high temperature reduces the elastic limit but little and gives a considerable increase of ductility, whereas the water-quenched specimen appears to gain in ductility at a sacrifice of elastic limit. While this may seem to be a point in favor of oil quenching, it should be considered that the oil-quenched specimen does not reduce as much proportionately to the water-quenched, in elastic limit for high temperatures of re-heating because a high elastic limit was not obtained on quenching. Mr. Devries concluded with the statement that the microstructures typical of both oil and water quenching seem to show that the heat treatment as a whole was little more than a grain refining process with a slight difference in favor of water-quenching.

L. H. Fry, of the Standard Steel Works Co., Burnham, Pa., said that there was a tendency toward cracking regardless of the quenching medium used, but that there is less tendency in this direction with oil than with water. The rate of cooling he considered more important than the medium used for quenching. He also cited tests involving the use of quenching mediums circulated with compressed air and those not circulated. Quenching in the medium circulated with compressed air effected cooling in 10 minutes whereas without such circulation, cooling required 20 minutes. The elastic limit with circulation was 69,000 pounds against 49,500 pounds without circulation; tensile strength 105,000 pounds as compared with 95,000 pounds for the medium without circulation; the elongations were practically the same, namely, 21 and 20.5 per cent and the reduction of area 42 and 43 per cent, respectively.

Horizontal vs. Vertical Quenching

The question of horizontal and vertical quenching methods then was discussed and it was the concensus of opinion that vertical quenching is to be preferred. Dr. Howe directed attention to the necessity of having the circulation of the cooling medium concentric with the axle to effect uniform quenching but Mr. Young stated that in the quenching charge it is customary to vertically suspend seven or eight axle forgings. With reference to horizontal quenching Mr. Fry said that no difference is found in the hardness on different points of the circum-

ference due to the fact that the cooling is relatively slow.

A progress report was submitted by the committee on the corrosion of iron and steel which last year instituted a series of exposure tests on copper-bearing iron and steel sheets. The report chiefly consisted of the chemical analyses of the large number of samples secured and which already are being tested. Additional sheets of the No. 16 gage copper-bearing pure iron will be obtained to contain the content of copper originally outlined when the research was undertaken and another lot of open-hearth steel will be secured of the specified low copper content, since the first lot contained a high percentage of copper. The puddled irons now undergoing exposure have a high copper content, probably due to the use of eastern Pennsylvania ores and an effort will be made to secure a genuine puddled iron substantially free from copper. The analyses show an unusually low percentage of carbon in most of these sheets, and it has been suggested that probably annealing and hot working reduces the percentage of carbon in the edges of the plates. The analyses submitted cover nearly 100 sheets of eight types of metal bought in the open market. The committee enlarged its field of endeavor by appointing a sub-committee which will study galvanized coatings.

Painting Iron and Steel Surfaces

The preparation of iron and steel surfaces for painting will be investigated by the Committee on Preservative Coatings for Structural Materials. In the preparation of steel or iron surfaces for painting, the proper adhesion of the paint should be insured and since it is improbable that paint acts chemically on these metals, the persistence of paint on iron primarily is a matter of adhesion which may be lessened or destroyed by any unsatisfactory surface and by the entrance or intrusion of solid or fluid material between the paint film and the metal. Continuing, the committee report follows:

Recently-rolled steel or iron is covered with a mill scale of anhydrous oxide, and if painted at once, the paint never touches the metal, but is applied to the mill scale. If this mill scale ever comes off, the paint comes with it, sometimes in scales. If the metal begins to rust by access of air and moisture, the rust penetrates under the mill scale and loosens it. Ordinary rust is hydrated oxide, and stimulates further corrosion, but the anhydrous mill scale does not, and it is objectionable because it may crack off by unequal expansion or from other causes.

In addition to mill scale and rust, other objectionable surface coatings which are frequently encountered are dirt, grease, oil, water and frost.

In considering methods for preparing these surfaces for painting it is well to take account of the methods used to secure the adhesion of substances other than paint to iron or steel. Such cases are, for example, the electrodeposition of copper or other metals; the plating of iron by molten metal; and the application of varnish enamels, such as are used on bicycles and many other metal surfaces. In all these processes it is essential that the coating should wear off from the outside, not peel off from the metal; and this is what is desired with paint. In all these cases, it is universally believed to be necessary that the coating material should come in actual contact on all parts of the surface with the actual metallic surface of the iron or steel; the latter must be freed from all dirt and grease, and from all scale and rust, before the coating is applied. This is done by (1) cleaning the surface with chemically active liquid, such as sulphuric acid, (2) by the sand blast, and (3) by other mechanical means, such as filing or polishing with an emery-belt, and the like. Unless this is done, it is found that the superimposed coating is likely to scale or flake off.

Cleaning by Sand-Blasting

The thorough methods of cleaning by sand-blasting and pickling can be and sometimes are applied to structural and car steel for painting and for repainting, and undoubtedly are the best methods known for the purpose. They are, however, much more expensive than the ordinary method which consists in scraping, wire-brushing and wiping grease and oil spots with gasoline or benzine.

The sand-blasting method has the advantage over the pickling method in that it is more general of application, the pickling method being confined to the shop and generally to the material before assembling. It may, however, be of interest to know that good authorities maintain that iron or steel cleaned by pickling holds a coating more securely than that which is sand-blasted, and that this is owing to the rougher surface, viewed with a microscope, of the acid-etched metal.

The scraper and wire brush do not remove the firmly adhering mill scale, in consequence of which most of the structural and freight-car steel is painted over mill scale. It must be remembered that all platers and enamelers insist absolutely on the complete removal of mill scale; therefore it must not be regarded as harmless, it certainly is less dangerous than ordinary rust.

The tests that are to be made in the preparation of iron and steel surfaces for painting include plates of ordinary structural steel or car steel of two general classes, namely, new steel and steel which has been painted and has become partly rusted. The new steel will be such as is delivered from the mill with the surface clean and free from rust and with mill scale intact. It is to be painted indoors in warm, dry air. Another test is to be made on steel with the surface in the average condition of steel which has been through the fabricating processes containing some surface rust, oil, etc. This is to be cleaned with a scraper and wire brush and the oil and grease spots are to be wiped with benzine or gasoline-soaked waste. Other plates are to be cleaned with the sand-blast and are to be painted immediately thereafter under the following conditions: Indoors in warm, dry air; indoors in warm, dry air after heating the paint; indoors in damp atmosphere and outdoors in cold, dry weather. Another plate is to be cleaned with the sand-blast and will be left outdoors for one week and then painted indoors in warm, dry air. The next test will be of a plate cleaned by the pickling process and painted immediately thereafter indoors in warm, dry air. A similar test will be made on another plate which will be permitted to stand outdoors for one week and then painted indoors in warm, dry air.

The following tests are to be made on steel which has been painted and become partly rusted: The plates will be cleaned with a wire brush only and then painted indoors in warm, dry air. Plates are to be cleaned with a scraper and wire brush, grease spots wiped with benzine and then painted indoors in warm, dry air. Plates are to be brushed, coated with benzine over and around the edges of the rust spots, benzine burned-off with a torch and the rusted surfaces then are to be wire-brushed and wiped, followed by painting indoors. The next plates are to be cleaned with the sand-blast and painted immediately in warm, dry air. The plates should not be less than 3/16-inch thick and as large as possible up to 24 x 36 inches. They should be selected of steel of the same or similar composition, preferably cut from the same original piece. The chemical composition either should be known from the mill reports or ascertained by analysis. Iron oxide paint will be used prepared on the Pennsylvania Railroad Co.'s specifications No. 31 A. The paint shall be prepared so that it will dry to the touch in eight hours in daylight in a dry, fresh atmosphere at 70 degrees Fahr. Two coats shall be applied, the second 48 hours after the first. The plates will be exposed 48 hours after the application of the second coat or as soon thereafter as practical. One set of plates will be exposed at Altoona, Pa., and the other at Brooklyn, N. Y., in an outside atmosphere at each place.

Preparing Plates By Pickling

In preparing the plates by the pickling process, if the metal is dirty or has oil on its surface, it shall be dipped for five minutes in a hot 10 per cent caustic soda solution, after which it shall be rinsed in hot water. Following this it shall be pickled in a hot, 10 per cent sulphuric acid solution until the rust and scale are removed. It next is to be dipped in hot water, then in a hot 10 per cent carbonate of soda solution, next in hot water and finally dried. If it is found to be more convenient, the acid may be removed by washing the surface with water from a hose under a pressure of not less than 100 pounds per square inch. This will completely remove the acid without the use of carbonate of soda. However, it is necessary to have the water discharged at a very high velocity to remove the conoidal iron sulphate, which is insoluble.

One entire session was devoted to papers and committee reports on non-ferrous metals and alloys. Extensive revisions in the standard specifications for spelter were recommended, which consisted essentially of a change in the grading of virgin spelter by the addition of grade, *Selected*, these grades now being as follows: *A*, High Grade; *B*, In-

termediate; *C*, Brass Special; *D*, Selected, and *E*, Prime Western.

In the former specifications it was provided that Brass Special Spelter shall not contain over 0.75 per cent lead, 0.04 per cent iron and 0.75 per cent cadmium. It also was to be free from aluminum and the sum of the lead, iron and cadmium was not to exceed 1.20 per cent. This was changed as follows: Brass Special Spelter shall not contain over 0.60 per cent lead, 0.03 per cent iron and 0.50 per cent cadmium, and the sum of the lead, iron and cadmium shall not exceed 1 per cent. Selected Spelter shall not contain over 0.80 per cent lead, 0.04 per cent iron and 0.75 per cent cadmium. It shall be free from aluminum and the sum of the lead, iron and cadmium shall not exceed 1.25 per cent. The previous specifications for Prime Western Spelter provided that it shall not contain over 1.50 per cent lead and 0.08 per cent iron, whereas the revision decreases the percentage of iron to 0.06, the percentage of lead remaining unchanged.

The section referring to sampling was stricken out and the following substituted: "Select 10 slabs at random from a car load and saw each slab completely across from the middle of one long side to the middle of the other and use the sawdust as the sample; or, drill three 9 mm. holes along one diagonal of each slab, boring completely through, and taking care to make fine drillings. The holes should be drilled as nearly as possible at the middle and half way between either end and the middle of such diagonals. Go over the drillings or sawings with a powerful magnet to take out any iron which may have come from the drill or saw, and mix the sample thoroughly. The drill or saw must be thoroughly cleaned before use, and no lubricant shall be used in either drilling or sawing." Section 7 of the former specification on analysis was substituted by one which provides for both electrolytic and lead acid methods of analyses.

W. M. Corse, chairman of the subcommittee on sand-cast metals and alloys, reported that data had been collected on various types of alloys and a study is being made of the relation between elastic limit and yield point, as well as behavior under compression. Tentative specifications also were presented for copper plates for locomotive fireboxes, for copper bars for locomotive staybolts, for seamless copper boiler tubes and for seamless brass boiler tubes.

Representatives of locomotive builders objected so strongly to the proposed tentative specifications for non-ferrous alloys for railway equipment in ingots, castings and finished car and tender bearings, that it was decided to refer them back to the committee for further consideration.

W. M. Corse and S. F. Comstock, of the Titanium Alloy Mfg. Co., Niagara Falls, N. Y., presented a paper entitled, "Aluminum Bronze; Some Recent Tests and Their Significance," in which the results of tension and endurance tests of manganese and aluminum bronzes were given. It was concluded that while manganese bronze may give better figures when tested in tension, aluminum bronze is far superior in endurance of alternating stresses.

Electrical Men

Conclude Four-Day Convention at Cleveland—Prominent Engineers Attend

The American Institute of Electrical Engineers concluded its four-day convention with a boat trip to Put-in-Bay on Friday, June 30. Technical sessions were held every morning during the convention. The afternoons and evenings were devoted to the entertainment planned by the Cleveland section. The entertainment features included a picnic and supper at Nela Park, a dance at the Shaker Heights Country Club, a theatre party and several luncheons.

A tendency on the part of the members to strive for independence from European markets for raw materials was brought out in a number of the discussions. The discussion which followed the reading of V. Karapetoff's paper on "Suggestions for Electrical Research in Engineering Colleges," was interesting due to the expression of opinion by educators and practical engineers. The general concensus of opinion, however, was that this research, whether industrial or purely scientific, should be encouraged in all feasible ways, so that America might be free from foreign research as well as from foreign markets.

Among the prominent engineers present during the convention were C. A. Adams, professor of electrical engineering, Harvard University; C. P. Steinmetz, General Electric Co. and Cole Maistre, general secretary of the Industrial Electrotechnical commission.

Germany's Plans for Post-Bellum Trade War

Germany's "engineering brains" have been amalgamated in one central organization called the German League of Engineering and Economic Associations in preparation for the struggle for the world's trade expected to follow the end of the war, according to reports in German newspapers reprinted in the London press.

The new organization embraces the following institutions: Society of German Engineers, Society of German Architects, Designers and Builders, Society of German Blast Furnacemen, Society of German Chemists, Society of Electrical Engineers, and Society of Shipbuilding Engineers.

The combination will represent a membership of 60,000 and may be said to incorporate all the scientific and engineering talent of Germany. The presidency of the new league has been given to Privy Councillor Professor Dr. Busley, managing director of the Schichau warship building plant at Danzig. Dr. Busley, an intimate friend of the Kaiser and Albert Ballin, is a distinguished marine engineer, who has been as conspicuously identified with the purely constructional side of the German navy and merchant marine, as von Tirpitz and Ballin, respectively, have been with their general development.

It is stated in Germany that the league of all the talents has been organized "to confront the great new tasks which the present era conjures up."

Observatory Given to Case School

Case School of Applied Science, Cleveland, announced last week that the trustees of the school had accepted the astronomical observatory owned by Ambrose Swasey and W. R. Warner. The gift was offered to the school by the donors as a dedication to scientific research and to the good of the public. The observatory which at present stands on the property of Mr. Swasey, 7808 Euclid avenue, Cleveland, will be moved to the campus and enlarged before the opening of school next fall. The observatory houses the large telescope which won the grand prize for astronomical instruments at the Panama-Pacific Exposition last year.

Rechartered.—Articles of incorporation have been filed in New Jersey by the Bethlehem Steel Co., a Pennsylvania corporation with a capital of $15,000,000. The New Jersey office is at 15 Exchange place, Jersey City. This rechartering of the company is understood to be in connection with the acquirement of property in the State of New Jersey, including a leasehold on land at Cape May, N. J., for proving grounds. The officers of the company are given as Eugene G. Grace, president; B. R. Jones, secretary, and W. F. Roberts, treasurer.

Rallying to Their Country's Call

Iron and Steel Companies Do Their Part

Workers in Offices, Furnaces and Mills Start for the Front—Great Industrial Survey Progressing—Many Employes to be Paid During Absence

THE work of the national committee on industrial preparedness, of which Howard E. Coffin is chairman, is proceeding satisfactorily and the war department has detailed five officers of the regular army to assist in the survey that is now being made. The committee occupies two suites of offices on the ninth floor of the Engineering Societies' building, West Thirty-ninth street, New York. Mr. Coffin states that in view of present conditions, the committee is exerting all possible pressure to complete its industrial survey as rapidly as possible. He says that the business men of the country continue to respond in the most patriotic manner and returns from the industrial inventory are pouring in from every part of the union. More than 100,000 manufacturing concerns have already reported to the committee their willingness to aid in every possible way in the manufacture of munitions and supplies of all kinds that will be needed in the event of war.

In an effort to ascertain how the manufacturers of iron and steel are responding, *The Iron Trade Review* has written to a few of the state chairmen and has received gratifying responses. Samuel G. McMeen, the Ohio chairman, replies as follows:

> In Ohio, the board of directors of the naval consulting board for that work has practically all of its instructions and inventory schedule material in the hands of engineers throughout the state, or in the hands of the heads of the industrial concerns in regions where no professional agent is in residence for appointment.
>
> Responses with completed inventories are being received daily, and as found correct these completed inventories are being forwarded to the New York headquarters of the naval consulting board.
>
> The response from manufacturers of iron and steel products and machinery has been fully as prompt and as satisfactory as that of any other industry. All industries, however, are accepting the task as an opportunity for helpfulness and we have discovered no backwardness in any quarter up to this time.

Alex Dow, Michigan chairman, says:

> We have found among the concerns engaged in the manufacture of iron and steel products an almost unanimous approval of the industrial inventory for preparedness and a willingness to furnish information beyond what we had anticipated. There has been steady progress and at present there is rapid progress towards the completion of the inventory. There will be some interesting stories to tell when the work is done and when we are free to tell them. But in the meantime there is nothing to say except that Michigan manufacturers, with very few exceptions, are more than ready to help us.

H. E. Barnard, the Indiana chairman, expresses the opinion that it would be a mistake for recruiting officers to accept for service as a soldier in the field any machinists or employes in any industry that would manufacture supplies in time of war. "It has been well established," says Mr. Barnard, "that industrial preparedness is of vastly greater importance than any other kind of preparedness, for without supplies and war munitions that would be manufactured by these industries, no army could remain in the field. There are plenty of men outside these industries who are willing and glad to enlist for field service, and they should be accepted first by the recruiting officers."

Mr. Barnard adds:

> "The co-operation of Indiana industries is all that we can hope. Many of the iron and steel industries in northern Indiana are sending in their reports through their home offices in New York city. All the Calumet manufacturers have met with George C. Hulst, a member of our board of directors, on two occasions and have entered enthusiastically into the work."

Maj. J. S. Sewell, the Alabama chairman, writes that he has been compelled to be absent from that state for some little time and is just getting in touch with the situation. He hopes soon to be able to furnish a definite statement as to the progress made.

Pittsburgh's Splendid Response

Pittsburgh, July 3.—Uncle Sam's efforts to place the National Guard of Pennsylvania on a war footing met with hearty support at Pittsburgh. Recruiting stations, located in the Eighteenth regiment armory and the Carnegie building were filled with young men anxious to go to the front immediately after they were established. Many applications for enlistment were not considered, however, because officers said it would be useless to accept additional volunteers because of insufficient equipment.

The recruiting of men for the Eighteenth regiment at Pittsburgh is in charge of Col. Henry P. Bope, vice president and general sales manager of the Carnegie Steel Co., who ranks as major of ordnance attached to the Second brigade of the Pennsylvania national guard. Colonel Bope always has taken great interest in the militia, and his activity during the past week was the subject of considerable praise and commendation by individuals and the press of western Pennsylvania. He spent the greater part of the past week, working late into the night, selecting men for the mobolization camp at Mt. Gretna, Pa. Colonel Bope was officially complimented by the federal and state officers in charge of the camp for the excellent service rendered by him and his corps of assistants at Pittsburgh and vicinity. The United States Steel Corporation, as previously reported in these columns, and nearly all manufacturers of prominence in western Pennsylvania, announced that they would pay the wages for an indefinite period of employes called to the front. Included in this list are: Subsidiary companies of the Corporation, the Westinghouse Electric & Mfg. Co., Westinghouse Airbrake Co., Westinghouse Machine Co., the Union Switch & Signal Co., the Westinghouse Foundry, the Pittsburgh Meter Co., the R. D. Nuttall Co., the United Engineering & Foundry Co., the H. K. Porter Co., the Rosedale Foundry & Machine Co., Mackintosh, Hemphill & Co., the Mesta Machine Co., the A. Garrison Foundry Co., the

Union Steel Casting Co. and the Wilson-Snyder Mfg. Co.

Many men employed by practically every concern in the Greater Pittsburgh district have gone to mobilization camps. More than 100 Carnegie company men and 241 employes of the Westinghouse Electric company entrained for Mt. Gretna during the week. Both the sales and operating departments of the larger companies contributed volunteers to the state militia. Six men from the main offices of the Carnegie company, including five clerks and one salesman, and a salesman from the Philadelphia office were among the first to volunteer their services to the country. Robert H. Bolling, connected with the sales department at Philadelphia, and his brother, Raynal C. Bolling, general solicitor for the United States Steel Corporation, who is a member of the aviation corps, have reported for duty for service along the Mexican border or elsewhere. Clerks, draftsmen, chemists, electricians, boilermakers, machinists, surgeons, roll turners, hot blast men, inspectors and laborers are included in the lists of steel company employes ready to serve their country.

In carrying out the military program, arrangements have been made for taking an immediate census of the industrial resources of Pennsylvania. A committee representing the naval consulting board of the United States met in the rooms of the Engineers' Society of Western Pennsylvania, June 27, to take first steps toward the mobilization of industries. Data are being collected to show the navy and war department, in a detailed manner, to what extent they may depend upon the Pittsburgh district for supplies of food, clothes, munitions and other necessities before or during hostilities. Pittsburgh is located in distrct No. 9 of the Pennsylvania branch of the naval consulting board; the district comprises Allegheny, Fayette, Greene, Washington, Westmoreland, Beaver, Butler, Armstrong and Indiana counties.

The local committees in charge of the work consists of Robert S. Orr, general manager, the Duquesne Light Co., chairman; James O. Handy, director of research of the Pittsburgh Testing Laboratory, vice chairman; Elmer K. Hiles, secretary the Engineers' Society of Western Pennsylvania, secretary; S. A. Taylor, mining engineer, and F. L. Garlinghouse, consulting engineer. Every industrial establishment in the district will be asked for confidential information for the use of the United States army and navy. Members of the Engineers' Society of Western Pennsylvania have volunteered to assist in the compilation of desired data. Dr. Raymond F. Bacon, director of the Mellon Institute; George S. Davison, president of the Gulf Refining Co.; Julian Kennedy, engineer, and Paul Spencer, all of Pittsburgh, are among the directors of the naval consulting board of Pennsylvania.

The Carnegie Steel Co. on Friday told *The Iron Trade Review* that 101 of its employes now are connected with the militia. Enlistments from plants and offices of the Carnegie company are as follows: General offices, six; Edgar Thomson Works, 20; Homestead Steel Works, 25; Ohio Works, 15; Upper and Lower mills, Youngstown, two; New Castle Works, 13; Upper Union mills, Pittsburgh, three; Columbus Works, three; Waverly warehouse, three; Baltimore warehouse, two; Philadelphia sales offices, three and one each from the Duquesne Steel Works, the Clark mill, the Neville furnaces and the New Orleans office. Raymond B. Davenport, chief electrician at the New Castle Works, ranks as a first lieutenant and Dr. Allan W. Urmson, company surgeon at New Castle, ranks as a surgeon major in the national guard. George S. Poffinberger, engineer of tests, the Duquesne Steel Works of the Carnegie Steel Co., is a second lieutenant. Lesley McDonald, a helper at the Homestead steel works, is a first lieutenant.

The Westinghouse Electric & Mfg. Co. states that 241 men employed in its offices and shops have started for the front. The National Tube Co., the American Sheet & Tin Plate Co., the American Steel & Wire Co., the Jones & Laughlin Steel Co., the Crucible Steel Co. of America, the Pittsburgh Crucible Steel Co., the Carbon Steel Co., the Colonial Steel Co., all of Pittsburgh; the Cambria Steel Co., Johnstown, Pa., and the La Belle Iron Works, Steubenville, have not yet completed lists showing the names of their employes who have started for the front. Officers of these companies, however, say that none of their sales or operating officials has left for mobilization points.

Steel companies and machine shops in the Greater Pittsburgh district are ready to meet almost any demand from the United States government for supplies of steel and munitions. Westinghouse companies have reserve capacity for the manufacture of shells and manufacturers of all types of machinery have signified their willingness to co-operate in equipping the army and navy. Numerous inquiries for trench tools, wire and rounds have come out since developments along the Mexican border started to assume rather serious aspects, although it is difficult to determine the source of such inquiries.

Pay Goes On

Youngstown, July 3.—The steel industry of the Mahoning valley was prominently represented when companies H and M and the Third Field Hospital corps departed from Youngstown within the past week to prepare at Camp Willis, Columbus, O., for the mobilization of the Ohio troops at the border.

To encourage the soldiers and to assist in taking care of dependents, the big steel companies of the Youngstown district, have all notified the troopers that their salaries will go on and when they return they will hold their standing at the plants, where their positions will be awaiting them.

Among the men in the various plants who have gone to the front, it is stated that about 10 were employes of the Republic Iron & Steel Co., about 12 employes of the Carnegie Steel Co., eight or nine from the Brier Hill Steel Co. and about 20 from the works of the Youngstown Sheet & Tube Co.

Several foundries are represented. In Co. H, John A. Logan III, captain of the troopers and a grandson of Gen. J. A. Logan, is vice president of the Carbon Limestone Co.; in Co. M, First Lieutenant H. Ross Raymond is chief of the fire squad at the works of the Youngstown Sheet & Tube Co.; Second Lieutenant G. W. Atwood, is chief of police at the Youngstown Sheet & Tube Co.'s plant.

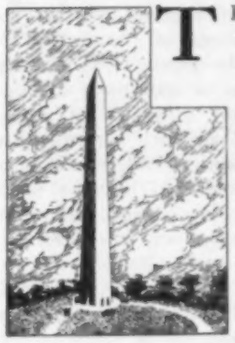
Will Inspect Trucks

The Perfection Spring Co., Cleveland, has voluntarily taken steps to assist the United States government to prepare for any eventualities which may arise in the Mexican situation. The company has sent E. O. Blanchard, superintendent of the Cleveland service station, to El Paso to survey the automobile trucks used by the government and to decide on the equipment necessary to replace or repair any springs which may be broken in service. Mr. Blanchard and the men who will accompany the supplies to El Paso will report to the depot quartermaster who has charge of approximately 10,000 tucks in use in the Mexican campaign. It is important that the trucks be properly maintained for, in the event of invasion, the army will be dependent upon these for communication with the base.

Business News of Nation's Capital

Many Important Provisions of the Naval Bill—Senate Votes to Eliminate Efficiency Methods from Watertown Arsenal

Bureau of *The Iron Trade Review*,
206 Corcoran Bldg.,
July 5, 1916.



THE naval bill as it passed the house carried a remarkable number of provisions extending government activities in the way of manufacturing and ship building. Further encroachment on the field of private enterprise is provided for in the bill as it was reported to the senate. It is expected to pass the measure in the upper branch of congress this week, with possibly few changes made in it.

It is perhaps needless to say that the added government schemes provided for are based upon recommendations made by Secretary of the Navy Josephus Daniels in letters he wrote to Senator Tillman, chairman of the committee on naval affairs, at various times during June. The bill, of course, continues such provisions as those placed in it by the house calling for a government armor plate plant, a government projectile plant, and the Tavenner amendment, eliminating scientific shop management from the navy yards. One particularly strong provision carried in the house bill called for an experimental laboratory for which $1,000,000 was appropriated. The senate bill struck this provision out and in its place appropriated $2,000,000 for an experimental and research laboratory where work will be taken up on the subject of gun erosion, torpedo motive power, the gyroscope, submarine guns, protection against submarine, torpedo and mine attack, improvement in submarine attachments, improvement and development in submarine engines, etc.

Among amendments added by the senate committee are those appropriating $200,000 for a foundry and forge shop at the Charleston, S. C. yard, $600,000 for an additional gun shop at the Washington, D. C. yard, $6,000,000 for building naval ships of all types by enlarging the yards at Puget Sound, Wash., Philadelphia, Boston, Norfolk, Va., Portsmouth, N. H., Charleston and New Orleans. The first three yards are to be equipped to build capital ships, while the other yards will be enlarged to construct the other types. The house bill appropriated this same sum, which was to be made available only in the event contracts for vessels could not be closed at "fair and reasonable prices." The senate bill also appropriates $300,000 for a floating crane for the Mare Island, Cal., yard, which is not to cost more than $600,000. For new and improved machinery and tools for the torpedo factory, the senate bill increases the appropriation from $100,000 to $189,000.

In recommending a foundry and forge shop at the Charleston navy yard, Mr. Daniels said that with this equipment it will be possible to provide immediate manufacture for both cast and forged steel parts, except the largest steel castings used in the construction of new ships. He complains that congested conditions of private plants had made in impossible to get more than two bids for this material for the battleship New Mexico, and that satisfactory delivery could not be made. Occasion is taken by Mr. Daniels to say that steel manufacturers of the United States have shown "real patriotism and a desire to facilitate both our construction and repair work in every way, but, nevertheless, in spite of their willingness and the effort they have made, we are still delayed, although we are on a peace basis and there are no extraordinary demand on such material by the navy."

The plant proposed provides for an open hearth furnace of five tons capacity to which it is intended to add two two-ton Tropenas converters now lying idle at the New York yard. The plan also includes an 800-ton forging press with annealing furnaces and other equipment.

Another added item in the senate bill appropriates $80,000 for appliances, equipment and storage facilities for handling, segregating and caring for materials and scrap. It is the plan of Mr. Daniels to have the navy yards work over much more of its scrap material than it has in the past, and to reuse all of it, if possible, instead of selling it. Heretofore, private firms have worked over material for the navy department, and have also purchased much of its scrap. It is proposed to purchase cranes, electric magnets and add storage bins, and provide other equipment for caring for the scrap.

The senate bill also authorizes the President to take over any private plant for the use of the navy in case of emergency, or to compel a private plant to convert itself so as to be of use to the navy, if it is possible to do so. A similar provision was contained in the recently enacted army reorganization bill.

Inefficiency Scores

Washington, July 4.—By a vote of 36 to 20, the senate went on record last Friday in favor of eliminating scientific shop management from the Watertown, Mass., arsenal. The vote was taken in connection with the Tavenner amendment in the fortifications appropriations bill. Senator Weeks of Massachusetts had made a motion to strike the amendment from the bill, when Senator Bryan, of Florida, made a motion to lay the Weeks amendment on the table.

Of the 36 voting in favor of the Bryan motion, 28 were Democrats, and eight were Republicans. Of the 20 voting against the motion, five were Democrats and 15 were Republicans. This left 39 not voting, either because they were absent or were paired with other senators.

Those against the Bryan motion:

Democrats — Clarke, Ark.; Gore, Hardwick, Lee, Md.; and Williams.

Republicans—Brandegee, Curtis, du Pont, Harding, McLean, Nelson, Oliver, Sherman, Smith, Mich.; Smoot, Sterling, Townsend, Warren, Weeks and Works.

The vote was not preceded by any discussion one way or the other. Senator Gallinger, however, had inserted in the *Congressional Record* a number of protests against the Tavenner amendment. Measures which have thus far passed both the house and senate carrying the Tavenner amendment include the sundry civil and fortifications bills. The naval bill is now before the senate and carries the amendment, as does also the army appropriation bill, which will soon be reported to that branch of congress. It seems a foregone conclusion that the fight to retain the efficiency system in government shops has been lost for this year, except that the postoffice appropriations bill has passed both branches of congress without carrying the Tavenner amendment.

Iron and Money: Fact and Comment

Mexican Affairs Dominate in Stock Market But Great Drive of Allies Holds Promise of Being Most Potent Factor

MEXICAN affairs and the conclusions made by Wall Street influenced stock market fluctuations almost entirely last week. When the situation looked as though war might be declared at any moment, stocks reflected the crisis by a sharp decline. When the Mexican authorities released the American soldiers whom they had been holding as prisoners stocks rallied just as sharply. Of much greater importance in the business world, although overshadowed by the more local disturbance, are the developments in the European war. The drive by the allies holds promise of being a most potential business factor. If it continues as successful as press accounts indicate it has been to date, the end of the war may soon be definitely in sight. If the allies are held as the Germans have been before Verdun the deadlock may resume while both sides rebuild their supplies of munitions. Near demoralization of the metal markets last week may have had definite connection with the present move by the allies. From a strictly iron and steel point of view among the most interesting developments in a financial way the past week were the declaration of a 30 cent disbursement against accumulated dividends of the Colorado Fuel & Iron Co., and the decision of the Carbon Steel Co. management to disburse 8 per cent on the company's first preferred stock this year, the first payment in seven years.

Following is a table comparing quotations of iron and steel stocks on the New York stock exchange at the close of business July 1.

	Close July 1.	Net chg.
American Can	52⅛	—1⅛
American Can, prfd.	109½	— ⅛
Amer. Car & Fdy.	53½	—3¼
Amer. Car & Fdy., prfd.	117	— ⅜
American Locomotive	67¼	—1⅛
American Locomotive, prfd.	101⅜	— ⅞
American Steel Foundries	49¾	+2⅜
Baldwin Locomotive	72½	—8½
Bethlehem Steel	440	—4½
Colorado Fuel & Iron	41½	+ ¼
Continental Can	100	+2
Crucible Steel	73	—5¼
Crucible Steel, prfd.	115	+ ⅜
General Electric	167	.....
Internat'l Harv. of N. J.	113⅜	+ ⅜
International Harv. Corp.	78	—2
Lackawanna Steel	67¼	+1
Republic Iron & Steel	45	+ ⅜
Republic Iron & Steel, prfd.	107½	.....
U. S. Cast Iron Pipe & Fdy.	21⅛	+ ⅛
United States Steel	85⅜	+1⅜
United States Steel, prfd.	117½	+ ⅜
Gulf States Steel	81	—2
Gulf States Steel, 1st prfd.	95	—1
Gulf States Steel, 2d prfd.	86	—2

The Western Crucible Steel Casting Co., Minneapolis, Minn., recently purchased a 400-kilowatt Synder electric furnace, said to be capable of melting 2,800 pounds of steel every 24 hours. This furnace has a rated holding capacity of one ton. The Western Crucible Steel Casting Co. is remodeling its foundry preparatory to the installation of the furnace.

New Merger

A merger of three Cleveland and Detroit manufacturers of automobile and stationary gas engine parts is announced by Charles E. Thompson, president of the Steel Products Co., Cleveland. The combination, which will take the name of the Steel Products Co., Cleveland, includes the former Steel Products Co., Cleveland; the Metal Welding Co., Cleveland, and the Michigan Electric Welding Co., Detroit. Under the new organization will be authorized $4,000,000 of stock, composed of $1,500,000 preferred and $2,500,000 common, but at present only $900,000 of the preferred will be issued together with $1,875,000 of the common. A statement of May 31, 1916, gives the net assets of the combined interests at $2,229,830, exclusive of good will. The officers will be as follows: President, Charles E. Thompson; vice president, W. D. Bartlett, and secretary and treasurer, J. A. Krider.

Pays Dividends

The Carbon Steel Co., Pittsburgh, has re-entered the list of dividend payers, having declared an 8 per cent disbursement on the first preferred stock. This is the first dividend on any of the company's shares to be declared since 1908. Carbon Steel has $500,000 first preferred outstanding, $1,500,000 second preferred and $3,000,000 common.

War Profits Over Rated

The annual report of the American Car & Foundry Co. for the year ended April 30 indicates that the company's profits from war orders have been over rated. Surplus of only 2.39 per cent remained for the common stock after payment of the 7 per cent preferred dividends. Net available for dividends amounted to $2,816,013, and the balance after allowance for preferred payments was $116,018. This surplus exceeded that of 1915, but was lower than was shown either in 1914 or 1913. President W. H. Woodin remarked to stockholders:

"Repeatedly throughout the year reports were current of the letting of contracts for the production of enormous quantities of munitions of war, with extravagant estimates of accruing profits. Many such reports were gross exaggerations and were without any foundation. That the exact effects so far as concerned the company might be known, the president has caused to be publicly stated the precise figures, amounting to approximately $7,300,000, of all such contracts undertaken by it."

Blast Furnaces Bought

The Wellston Iron Furnace Co., recently incorporated, has taken over the two Wellston blast furnaces at Wellston, O., purchased at receiver's sale June 5 by S. E. Sternberger, and which were formerly owned by the Wellston Steel & Iron Co. A third furnace was bought in by H. S. Willard. Officers of the new company are: President, W. L. Sternberger; vice president and general manager, S. E. Sternberger; secretary, Joseph McGhee; general superintendent, J. G. Harding. Both stacks are being repaired. No. 2 stack will be lighted July 15 and will run on bessemer iron. Repairs on No. 1 stack will require about 60 days. The third furnace of the old Wellston company also is being repaired and will be relighted in a short time.

Dissolution Effected

Articles of dissolution of the Pennsylvania Steel Co. of New Jersey have been filed at Trenton. This action is a step toward the completion of the consolidation of the Pennsylvania Steel Co. and the Bethlehem Steel Co., which now is in its final stage. The Pennsylvania Steel Co. of New Jersey was incorporated April 29, 1901, and acquired 99.8 per cent of the stock of the Pennsylvania Steel Co. of Pennsylvania, which was the owner of the Steelton, Pa., plant, the Lebanon, Pa., blast furnaces, a large interest in the Cornwall Ore Bank and other property. The Pennsylvania Steel Co. of New Jersey also has been the owner of the entire capital stock of the Maryland Steel Co., Sparrows Point, Md.

MEN OF THE IRON TRADE

Who they are Where they are What they are doing

THE American Steel & Wire Co., Pittsburgh, announces appointments, effective July 1: John Wheeldon, formerly at the Cuyahoga works, Cleveland, has been appointed superintendent of the South works, Worcester, Mass., to succeed J. F. Tinsley, who resigned to become identified with the Crompton & Knowles Loom Works, Worcester. G. L. Peters of the American works, Cleveland, has been appointed superintendent of the Cuyahoga works, Cleveland; F. Ingram of the Rockdale works, Joliet, Ill., has been appointed superintendent of the American works, Cleveland; and L. E. Booth of the Scott Street works, Joliet, has become superintendent of the Rockdale works, Joliet. H. R. Patterson of the Trenton works, has been appointed superintendent of the Scott Street works, Joliet, and B. J. Spalding of the Donora works, has been appointed superintendent of the Trenton works, Pittsburgh district.

A. A. Fowler, New York partner of Rogers, Brown & Co., has gone on a salmon fishing trip along the Cascapedia river in Quebec.

The Midvale Steel Co., Cambria Steel Co. and Worth Bros. Co. has organized an order and shipping department to be located in the general offices of these companies in the Widener building, Philadelphia. John C. Neale, general manager of sales of the three companies, will have supervision of this department and has named F. H. Lewis, formerly of the order department of the Carnegie Steel Co. at Pittsburgh, as manager of orders. The new department will receive orders from the sales department and place them at the various mills for execution to the best advantage of both the company and the customers.

Samuel A. Benner, of the American Steel Export Co., New York, sailed for Petrograd, June 23, in the interest of his company.

Chas. E. Faeth, president of the Faeth Iron Co., Kansas City, Mo., has been elected president of the Kansas City Commercial Club.

H. B. McMaster, manager of branches of the Berger Mfg. Co., Canton, O., has resigned to become vice president and general manager of the Gordon Tire & Rubber Co. of Canton.

Clyde E. Dickey has resigned his position as secretary and sales manager of Denman & Davis, New York, with whom he has been associated for the past 11 years, and has organized the Dickey Steel Co., with offices in the Woolworth building, 233 Broadway, New York. He is president of the new company, which will represent several manufacturers of high-grade steel.

Wm. H. Yetman, who at one time was hydraulic engineer with the Bethlehem Steel Corporation, has been appointed railroad sales manager for the entire country of the Pyrene Mfg Co., New York.

M. D. Tracy of the purchasing department of the J. I. Case Threshing Machine Co., Racine, Wis., has become assistant purchasing agent of the Advance-Rumely Thresher Co., LaPorte, Ind.

W. Hinckle Smith, who was filling an unexpired term as the director of the Wm. Cramp & Son Ship & Engine Building Co., Philadelphia, has been elected for a full term. The retiring directors of the company have been re-elected.

A. E. Crockett has been appointed head of the department in charge of the selling of chain of the Jones & Laughlin Steel Co., Pittsburgh. Mr. Crockett, who was connected with the Standard Steel Chain Co. a number of years, is well known in the iron trade.

H. C. Crawford has been placed in charge of all traffic matters of the Midvale Steel Co., Cambria Steel Co. and Worth Bros. Co., with the title of traffic manager, effective June 15. Mr. Crawford formerly was traffic manager for the Cambria Steel Co.

James F. Barker, principal of East Technical high school, Cleveland, has resigned to become president of the Mechanics Institute, Rochester, N. Y. Mr. Barker graduated from Cornell University in 1893 and became principal of East Technical high in 1906.

A. W. Sinnamon, a mechanical engineer of Montreal, Canada, has been visiting manufacturers in the Pittsburgh district recently. He announced that he was anxious to buy about $1,000,000 dollars worth of equipment for the manufacture of tools used in Canada.

A. E. Bateson has been chosen manager of purchases of the Allis-Chalmers Co. to succeed William P. Harper, who died a few weeks ago. Mr. Bateson has been in the employ of the Allis-Chalmers Co. for 27 years. F. E. Haker, who has been in the purchasing department for some time, was named assistant manager of purchases.

Output Increased

Manganese Ore Output Broke Records in 1915

The production of manganese ore in the United States in 1915 was 9,651 long tons, the largest since 1901 and more than three times the production in 1914, which was 2,635 tons. This output was made by 34 operators in 10 states, of which the four most important, in order of output, were Georgia, California, Virginia and Arkansas, according to figures compiled by the United States geological survey. In addition, Alabama, Arziona, Colorado, Tennessee, Texas and Utah produced small amounts of ore. The imports of manganese ore for 1915 were 313,985 tons, which should be compared with 283,294 tons for 1914. Of the ore imported in 1915, 268,786 tons, or 85 per cent of the total, came from Brazil—more than twice the quantity received from Brazil in any preceding year. The imports from India were 36,450 tons, or about one-fourth the average of the preceding 10 years. No ore was received from Russia.

The production of manganiferous iron and silver ores for 1915 was 798,404 tons, which was almost twice the output in 1914. Most of this ore was used in making high-manganese pig iron, but a large quantity was used as a flux by lead smelters; 66,530 tons contained more than 15 per cent manganese and a large part of this was used to make low-grade ferro-manganese.

The quantity of ferro-manganese marketed in 1915 was 144,260 tons and the imports were 55,263 tons. The available supply, or 199,523 tons, was greater than that for 1914 but 15 per cent less than the average for the preceding two years, which covered a period preceding the war in Europe.

The prices offered for manganese ore adapted to the manufacture of ferro-manganese rose during 1915 to the highest figures that have been recorded for 30 years. In August eastern alloy makers offered $22.50 a ton for 50 per cent ore, which should be compared with $12.50 per ton, the average price for the preceding five years. In March, 1916, it was reported that $32.50 per ton was paid for such ore.

Railroads Plan to Buy More Tools

Bulk of Eastern Business Consists of Small Orders—Market Strengthened by Business From Italy and Russia—Large Transactions Exceptional

A VOLUME of business which in normal times would be considered large continues to characterize the machine tool market in the east. Demand, however, is by no means as active as it has been in the past and bookings tend to diminish in volume. Large transactions are becoming more exceptional and small orders are somewhat less numerous than they were. The biggest business before the trade during the week is the purchase by the American Locomotive Co. of a number of heavy tools involving an expenditure of about $100,000. Practically all the other business closed in the east is comprised of small orders involving one or two tools each. There is practically no railroad business to report and no new lists have come out from these interests. One large railroad, however, which for sometime has held up action on a large list of machine tools due to lack of money, has declared the necessary appropriation and as a result it is expected the business will be placed shortly. Practically no business has resulted from the inquiries for tools which were issued recently by concerns that were figuring on new shell contracts. It develops that in several cases these companies have been unable to accept the contracts, since the high prices they would have had to pay for their steel would have allowed practically no profit on the finished shells. The General Electric Co., in addition to large purchases of machine tools for its own account, recently purchased much equipment for its subsidiary, the Fort Wayne Electric Works, Fort Wayne, Ind. It is understood that large additional requirements for the Fort Wayne plant remain to be closed. Demand for machine tools for export again has improved. A large business was entered during the week from Italian buyers, and much additional business come from Russia and other countries, although foreign buying in general is not so lively.

New Factories to Increase Tool Demand

United States Cast Iron Pipe & Foundry Co. is about to extend its plant at Scottdale, Pa. Pulaski Foundry & Machine Co., Pulaski, Va., is planning to erect two large foundry buildings. Remington Arms-Union Metallic Cartridge Co., Bridgeport, Conn., has let a contract for the erection of another large addition. Diamond Link Fence Co., Boston, is about to build a large manufacturing building. A. B. Schultz, 786 Ashland avenue, Buffalo, is about to erect a motor-manufacturing plant. Massachusetts Machine Co., 27 School street, Boston, will build a large foundry and machine shop. O. J. Bloss Iron Works, 253 Monitor street, Brooklyn, will build a large addition. H. H. Franklin Mfg. Co., Syracuse, N. Y., is having plans drawn for a large plant extension. Titanium Alloy Mfg. Co., Niagara Falls, N. Y., will erect a large machine shop. Bossert Co., manufacturer of stampings, Utica, N. Y., will build a large addition. Beaton & Cadwell Mfg. Co., New Britain, Conn., is about to build a large 6-story addition. North & Judd Mfg. Co., New Britain, Conn., is about to extend its capacity. Clark Bros. Bolt Co., Southington, Conn., has let a contract for the erection of a large addition. Adriance Machine Co., Brooklyn, has bought a site on which it will erect a large extension.

Chicago Market Slumps

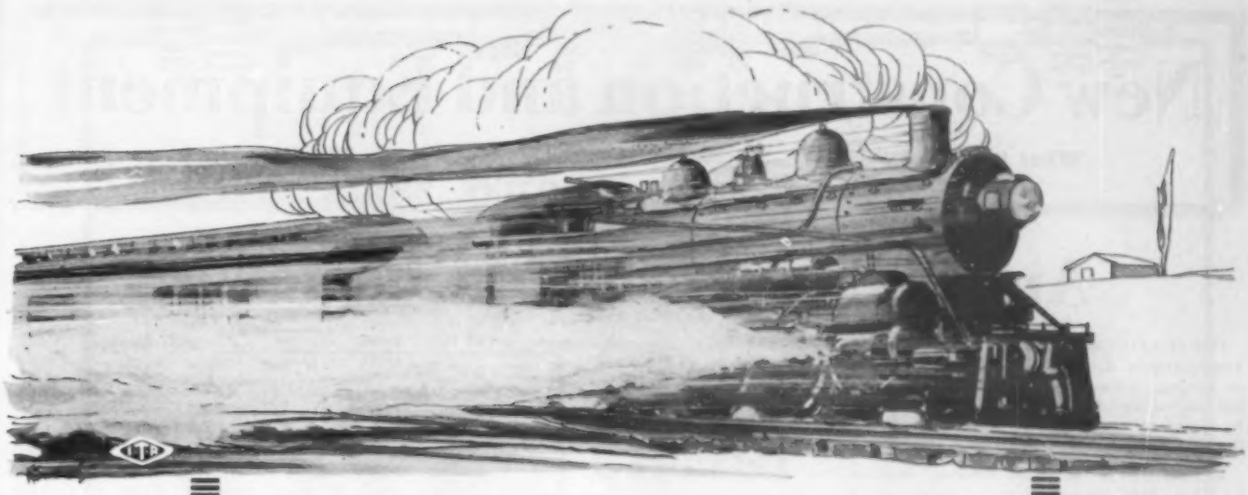
BUSINESS among machine tool dealers in Chicago seems more irregular and quiet than has been the case for several months. One week brings a fairly large total of business and the next week is likely to be almost devoid of selling. With midsummer approaching, this condition is natural as far as domestic demand is concerned. Foreign buyers appear to be asking for much less equipment than formerly and practically nothing in this line is now active in the western market. Dealers who have taken orders for export equipment in the past are busy shipping, but are not booking new business. Heavy inquiries by railroads during the spring have resulted in comparatively small buying; one important road has taken about half the machinery for which it asked and others even less. Domestic users are continuing to buy single machines and small lots to complete their equipment, but usually this buying is done without formal inquiry and the business goes to the dealer who is situated to give best delivery.

Domestic Buying Strong in Pittsburgh

PITTSBURGH machine tool dealers continue to enjoy a heavy volume of business. Although the market does not reflect the snap that featured the general situation a few months ago, yet no diminution in domestic buying is noted. Several prominent selling agencies say that orders in June were as attractive and remunerative as those received in any corresponding period this year. Subsidiary companies of the United States Steel Corporation, including the Carnegie Steel Co. and the National Tube Co., together with the Jones & Laughlin Steel Co., the Mark Mfg. Co., the Westinghouse Electric & Mfg. Co. and other Westinghouse interests, are among the concerns that have been figuring prominently in the Pittsburgh market for a diversified line of machinery and heavy rolling mill equipment. The Mark company, it is understood, has quietly closed negotiations for the greater part of the equipment for its projected tube mill at Indiana Harbor, Ind.

Railroad Lists Pending in Cincinnati

A GOOD demand for planers has been one of the features of the Cincinnati machine tool market during the past month. Most of the sales are to domestic users, as makers are unable to meet the immediate shipment specifications that usually accompany inquiries from Europe. Lathes continue to sell in large numbers, although during June the sales were slightly below those of the preceeding month. The number of milling machines sold during June exceeded that of any month since last February. Portable and bench grinding tools are being shipped in large quantities to the Russian government. Machine tool shops in Cincinnati are operating between 95 and 100 per cent of capacity. Buying by railroads is a little more encouraging, as several good lists are pending, such as those of the Chesapeake & Ohio railroad and the Big Four railroad.



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CLEVELAND OFFICE—Hickox Building, The Hamill-Hickox Co., District Representative
CHICAGO OFFICE—Room 1511-12 Lytton Bldg., East Jackson Blvd.
A. Schaeffer, District Representative
PHILADELPHIA OFFICE—902 Widener Bldg. Frank Wallace, District Representative

New Construction and Equipment

What it is **Where it is** **Who's doing it**

Among New England Factories

PORTLAND, ME.—The Valley Material & Transportation Co. has been incorporated to do mining, milling and smelting with $7,500,000 capital by A. B. Brewer, president; H. P. Sweetser, treasurer and clerk, and H. L. Cram.

LEBANON, N. H.—The Lebanon Machine Co. has been incorporated to carry on a general machinery, manufacturing and foundry business. The company is capitalized at $100,000 by Thomas P. Waterman, Thomas F. Dwyer, Arthur H. Hough, A. B. Hunt and Phil R. Hatton.

HARTFORD, VT.—Plans are being prepared for a brick and stone, 1-story railroad station to cost $50,000, for the Central Vermont Railroad Co. and the Boston & Maine Railroad Co. at White River junction.

BOSTON.—The Barrett Brothers have been incorporated to deal in machinists' goods with $10,000 capital by Edward A. Carroll, Harry M. Cook and Walter N. Buffum.

BOSTON.—The Massachusetts Casting Copper Co. has been incorporated with $10,000 capital by M. E. Thomas, M. B. Wilson and R. J. Holmes.

BOSTON.—The United States Fastener Co., 93 Milk street, has let a contract for erecting a 3-story and basement, 40 x 65-foot plant at South Boston.

BOSTON.—H. L. Gilman, architect, 8 Congress street, is preparing plans for a 180 x 400-foot foundry and machine shop for the Massachusetts Machine Co., 27 School street.

BOSTON.—The Gile Marine Engine Co. has been incorporated with $300,000 capital by Carleton H. Hutchinson, Herbert A. Palmer, Joseph F. Warren and Fred H. Gile.

BOSTON.—The Diamond Link Fence Co., 43 West street, has let a contract for the erection of a 1-story, 150 x 150-foot factory building.

BOSTON.—The Universal Winding Co. has been incorporated to make machine parts, tools, etc. The concern is capitalized at $1,250,000 by Joseph R. Leeson, president; Robert A. Leeson, treasurer, and H. L. Rice.

CAMBRIDGE, MASS.—The Boston Woven Hose & Rubber Co. has let a contract for the erection of a 4-story and basement, 65 x 322-foot plant addition.

CHICOPEE, MASS.—The Excelsior Needle Co. will build a 1-story, 40 x 150-foot plant addition.

EVERETT, MASS.—The Sexton Can Co. will build a brick, 2-story, 80 x 120-foot addition on the roof of its Cross street factory.

FALL RIVER, MASS.—James N. Buffington will build a brick, stone and steel, fireproof, 5-story, 40 x 80-foot business block at Bedford and Purchase streets.

HOLYOKE, MASS.—The Boston & Maine Railroad Co. will build a brick, 1-story, 60 x 150-foot addition to its freight station at the foot of Appleton street.

LEE, MASS.—The J. F. Crowe Construction Co., Albany, N. Y., has been awarded a contract by the town of Lee, to build a brick steel and stone, fireproof, 2-story, 60 x 112-foot school to cost $35,000.

LOWELL, MASS.—Plans will be ready to figure in about three weeks for a brick, mill-construction, 3-story, 50 x 200 and 100 x 200-foot factory for the Costikyan Carpet Co. to cost $300,000.

MILLBURY, MASS.—The Worcester Consolidated Street Railway Co. will build a concrete bridge over the Blackstone river at Elm street to cost $5,000.

NEW BEDFORD, MASS.—The city of New Bedford will build a brick, 1-story and basement, 140 x 200-foot school to cost $150,000 at Hathaway, Diamond, Belleville and Rhodes streets.

NEW BEDFORD, MASS.—The Belleville Warehouse Co. has been incorporated with $250,000 capital by William Whitman, Leonard C. Lapham, William B. Gardner and Arnold C. Gardner. The company is building a concrete, 8-story warehouse to be used by the three William Whitman mills in New Bedford.

NEWBURYPORT, MASS.—Bids will close Aug. 1 for a brick, stone and wood, 1-story and basement, 85 x 94-foot post office building to cost $70,000 at Green and Pleasant streets.

PITTSFIELD, MASS.—The Kinney Worsted Yarn Co. has been incorporated with $80,000 capital by Henry R. Russell, president, and Carey R. Kinney, treasurer, and will erect a plant at Pittsfield.

SOUTHBRIDGE, MASS.—Bids will close July 10 for a brick, 2-story and basement, 67 x 95-foot school on the Marcy street extension, to cost $60,000.

SPRINGFIELD, MASS.—The United States Electric Light Co. has let a contract for erecting a power plant addition to cost about $700,000.

SPRINGFIELD, MASS. — The Economy Trolley & Bushing Co. has been incorporated with $100,000 capital by Lewis J. Tetlow, John Aldrich and R. P. Smith.

WORCESTER, MASS. — The Norton Co. will erect a 3-story, 116 x 134-foot addition and a 1-story, 80 x 96-foot, power house.

WORCESTER, MASS.—The American Steel & Wire Co. has awarded a contract for a brick, 1-story, 51 x 113-foot addition to its galvanizing building at its south works.

WORCESTER, MASS.—The Worcester Consolidated Street Railway Co. has awarded a contract for a brick, 1-story, 96 x 35-foot addition to its freight station at 45 Green street.

WORCESTER, MASS. — The Worcester Lunch Car & Carriage Mfg. Co. has awarded a contract for a brick, steel and mill-construction, 1-story and basement, 62 x 116-foot factory to cost $20,000 at Southbridge street and Quinsigamond avenue.

WORCESTER, MASS.—The J. W. Bishop Co., general contractor, is figuring plans for building a brick, 3-story, 100 x 140-foot addition to the spinning mill, and a brick, 3-story, 100 x 125-foot addition to the storehouse of the Canadian-Connecticut Cotton Mills, in Quebec, Ont., at a cost of $90,000.

WORCESTER, MASS.—The Reed Small Tool Works has been incorporated to manufacture and deal in small tools, metal products and hardware at Cherry and Vine streets. The company is capitalized at $25,000 by Edgar H. Reed, president, Edgar E. Lothrop, treasurer, and Donald D. Simonds.

PAWTUCKET, R. I.—The Pawtucket Screw Co. has awarded a contract for a brick, 1-story, 40 x 119-foot factory on Hughes avenue.

PROVIDENCE, R. I.—The American Emery Wheel Works will build a 3-story, 50 x 90-foot plant addition.

PROVIDENCE, R. I.—The General Machinery Co. has been incorporated with $3,000 by Eric L. Anderson, Harry M. Burt and S. S. Ovak.

BRIDGEPORT, CONN.—The Bryant Electric Co. is building a 60 x 130-foot addition with a 50 x 50-foot wing. A part of the addition will be equipped with machinery for manufacturing electric wiring appliances.

BRIDGEPORT, CONN. — The Connecticut Construction Co. will build a brick and stone, 4-story and basement, 110 x 200-foot building to contain 132 apartments and to cost $150,000 on Washington avenue.

BRIDGEPORT, CONN. — The American Graphophone Co. will build a large power plant and a steel and concrete, 3-story addition to the factory of the Birdsey-Somers Co. on Barnum avenue.

BRIDGEPORT, CONN. — Nathen Nussenbaum will build a brick and steel, fireproof, 8-story, 140 x 180-foot building to consist of three attached apartment houses with 48 apartments and to cost $150,000 on Washington avenue.

CHESHIRE, CONN.—The Connecticut Brass Co. has let a contract for the erection of a 1-story, 40 x 140-foot casting shop.

DANBURY, CONN.—Fletcher & Thompson, engineers, Bridgeport, are taking bids on the construction of a 1-story, 170 x 240-foot plant at Danbury for the Ball & Roller Bearing Co.

GROTON, CONN.—The New London Ship & Engine Co. has let a contract for erecting a 2-story, 60 x 165-foot addition to cost $20,000.

HARTFORD, CONN.—The Whitney Mfg. Co. will build a 4-story, 58 x 112-foot addition.

HARTFORD, CONN.—Wm. T. Marchant, architect, 36 Pearl street, is preparing plans for a 3-story, 40 x 80-foot plant for the Skat Mfg. Co.

HARTFORD, CONN. — Arthur McMullen, New York City, has been awarded a contract to build the Derby-Huntington bridge for $248,725.

HARTFORD, CONN.—A permit has been issued to the Overland Stores Co., Toledo, O., to build a brick and reinforced concrete, 3-story, 120 x 139-foot garage and service build-

War Talks With

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EAST CHICAGO, IND.

All Kinds of Iron and Steel Rolls and Steel Castings.

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ing at Asylum and Hurlburt streets at a cost of $140,000.

MERIDEN, CONN.—The International Silver Co. has let a contract for erecting a 1-story, rolling mill addition.

NEW BRITAIN, CONN.—The Beaton & Cadwell Mfg. Co. is having plans prepared by W. H. Cadwell, architect, for a 6-story and basement, 40 x 114-foot plant addition.

NEW BRITAIN, CONN.—The North & Judd Mfg. Co. is having plans prepared by John A. Stevens, engineer, Lowell, Mass., for a power plant and factory addition.

NEW LONDON, CONN.—Plans are being prepared for a brick, 13-story addition to the Mohican hotel on State street, to cost $300,000.

NEW MILFORD, CONN.—The Robertson Bleachery & Dye Works has awarded contracts to the J. W. Bishop Co., Worcester, Mass., to build its brick plant at New Milford and to H. W. Butterworth & Son, Philadelphia, to furnish the machinery equipment. Lockwood, Greene & Co., Boston, are the engineers. The main mill will be three stories and several others will be two stories. The works was recently incorporated with $700,000 capital by Charles N. Robertson, Lonsdale, R. I., president, Charles N. Robertson Jr., vice president, and William H. Robertson, Pawtucket, R. I., secretary and treasurer.

SOUTHINGTON, CONN.—The Clark Bros. Bolt Co. has awarded a contract to Louis A. Miller, Meriden, Conn., for the erection of a 40 x 300-foot plant addition.

SOUTHINGTON, CONN.—The Rowe Calk Co. has started work on a 50 x 50-foot addition to its plant in Plantsville, which will be used as a drop forging department. It will be equipped with new steam hammers.

UNCASVILLE, CONN.—R. H. Melcer will build a brick and steel, fireproof, 2-story and basement, 90 x 100-foot school in Palmertown to cost $60,000.

WATERBURY, CONN.—The Metal Specialty Mfg. Co. has awarded a contract for a brick and steel, mill-construction, 1-story, 98 x 170-foot factory and a boiler house to be erected at Browns farms.

WATERBURY, CONN.—The National Mfg. Co. has been organized with $5,000 capital to make metal stamping goods. The incorporators are James E. Doyle, Worcester, Mass., president, Theodore I. Driggs, secretary and treasurer; John Trounstine and Clarence W. Sprague, New York, and George A. Driggs.

WEST HARTFORD, CONN.—The Abbott Ball Co. has let contracts for the erection of a 1-story, 12 x 50-foot plant addition and for new boiler and switchboard rooms.

From the Alleghenies to the Sea

BATAVIA, N. Y.—The city of Batavia will build a power house and filtration plant. Plans are being revised by the engineers, Chester & Fleming, Pittsburgh, and Geo. W. Fuller, 170 Broadway, New York.

BROOKLYN, N. Y.—The W. S. Electric Galvanizing Co., L. Pollkoff, president, has completed plans for a 3-story plant addition.

BROOKLYN.—The O. J. Bloss Iron Works, 253 Monitor street, will build a 1-story, 40 x 60-foot finishing shop.

BROOKLYN, N. Y.—The Adriance Machine Co., manufacturer of automatic sheet metal presses, can machinery, etc., has purchased a site opposite its present plant and will build a large addition.

BUFFALO.—The Contact Process Co. will build a 1-story, 100 x 500-foot plant.

BUFFALO.—The Barcalo Mfg. Co., 225 Louisiana street, has let a contract for erecting a 2-story, 90 x 106-foot addition.

BUFFALO.—The Strong Steel Foundry Co. has let a contract for erecting a 2-story, 50 x 50-foot pattern shop addition.

BUFFALO. — The Buffalo Potteries has awarded a contract for erecting a 3-story, reinforced concrete addition to its plant at Hays place and the Pennsylvania railroad. D. D. Martin is secretary of the company.

BUFFALO, N. Y.—The Sizer Forge Co. is building a large forge plant capable of producing large forgings for stern and rudder frames for large vessels. The plant will include an open-hearth furnace.

BUFFALO.—G. Morton Wolfe, architect, Henkle building, is taking bids on a 2-story, 100 x 176-foot addition to be erected for the Acme Pattern & Machine Co., 38 Letchworth street.

BUFFALO.—Pasquale L. Gimini, architect, 47 Niagara street, is taking sub-bids on 2-story, 50 x 200-foot motor-manufacturing plant to be erected for A. B. Schultz, 786 Ashland avenue. The architect is also completing plans for a 1-story, 50 x 100-foot factory building for Mr. Schultz.

CORTLAND, N. Y.—The Cortland Foundry & Machine Co. has let a contract for erecting a foundry and machine shop to cost $35,000.

ELMHURST, L. I.—The Norma Co., of America, 1790 Broadway, New York, manufacturer of ball bearings, W. H. Nones, president, will build a 4-story, 70 x 320-foot manufacturing plant and a 1-story, 40 x 60-foot power house at Elmhurst, to cost about $150,000. The architects and engineers are Francisco & Jacobus, 200 Fifth avenue, New York.

LONG ISLAND CITY, N. Y.—The Degnon Realty & Terminal Improvement Co., 30 East Forty-second street, New York, is having plans prepared by Wm. Higginson, architect, 3 Park Row, New York, for a 4-story, 80 x 192-foot plant to be erected at Long Island City to cost $75,000. The building will be occupied by Marcus Ward & Co., 200 Fifth avenue, New York.

NEW YORK.—The Corona Typewriter Co., 141 West Forty-second street, will erect a 4-story, 50 x 162-foot plant at Groton, N. Y.

NEW YORK.—F. Ewing, engineer for the Mexican Petroleum Corporation, 120 Broadway, is preparing plans for an oil distributing plant to be installed at Chelsea, Mass., at a cost of $300,000.

NEW YORK. — The Westchester Machine Co. has been incorporated with $10,000 capital to manufacture machinery. The new company is incorporated by J. A. Berstein, J. Peyser and J. Blank, 428 Highland avenue, Mt. Vernon.

NEW YORK.—The Chevrolet Motor Co., 600 West Fifty-seventh street, has let a contract for erecting two additions to its automobile plant. They will be five stories, 200 x 200 feet and three stories, 100 x 150 feet, respectively.

NEW YORK.—The Surety Engineering Co., 127 Duane street, has taken a contract from the Port Reading Railroad Co. to erect at Port Reading, N. J., a coal-thawing shed. The plant will cost $105,000 and will be used in winter in connection with the coal-dumper now being erected at Port Reading.

NEW YORK. — Gaffney, Cahegan & Van Etten, 52 Vanderbilt avenue, are preparing plans for a $3,500,000 garbage disposal plant to be erected on Prall's island, Staten Island, N. Y. It will be leased and operated by the Metropolitan By-Products Co., R. J. Lyons, manager, 3 East Forty-fourth street, New York.

NIAGARA FALLS, N. Y.—The Hydrol Co., 125 Front avenue, New York City, plans to build a 2-story factory, 50 x 100 feet, at Union and Iroquois streets. Thornton Chard, 101 Park avenue, New York City, is preparing the plans.

NIAGARA FALLS, N. Y.—The Titanium Alloy Mfg. Co. will erect a 2-story, 50 x 100-foot machine shop.

ROCHESTER, N. Y.—The M. B. Schantz Co. will build a 1-story, 49 x 101-foot factory building.

SCHENECTADY, N. Y.—The General Electric Co has let the structural contract for a 1-story, 200 x 200-foot, wire and cable plant, to cost about $90,000.

SYRACUSE, N. Y.—The Hotaling Warner Co. will build a 1-story and basement, 40 x 41-foot power plant.

SYRACUSE, N. Y.—H. J. Reidpath & Sons, architects, Buffalo, are preparing plans for a 3-story, 220 x 240-foot addition to be erected at Syracuse by the H. H. Franklin Mfg. Co., at a cost of $250,000.

THROOPSVILLE, N. Y. — The plant of Weddingen & Meyer, manufacturers of farm implements, was badly damaged by fire recently.

TOMPKINSVILLE, S. I., N. Y.—Louis De Jonge & Co., 73 Duane street, New York, will build a 6-story, 231 x 255-foot manufacturing plant and power house at Tompkinsville to cost $400,000. Valentine & Kissam, 25 Madison avenue, New York, are the architects.

UTICA, N. Y.—Cooper & Begg, architects, are perparing plans for a 3-story factory building for the Bossert Co.

YONKERS, N. Y.—The Habirshaw Electric Cable Co. will erect a 2 and 3-story, 200 x 300-foot plant addition, to cost about $100,000. The Fletcher-Thompson Engineering Co., Bridgeport, is the engineer.

ASBURY PARK, N. J.—Henr and Walter Rosenberg have purchased property at St. James place and Cookman avenue on which they will build a theater to cost $150,000.

AVENEL, N. J.—Frank H. Smith, engineer, 120 Broadway, New York, is building a 3-story, 82 x 622-foot plant at Avenel, for the Steel Furniture Co.

BARTLEY, N. J.—Wm. Bartley & Sons will build a 2-story, 27 x 84-foot foundry and machine plant to replace the structure recently burned.

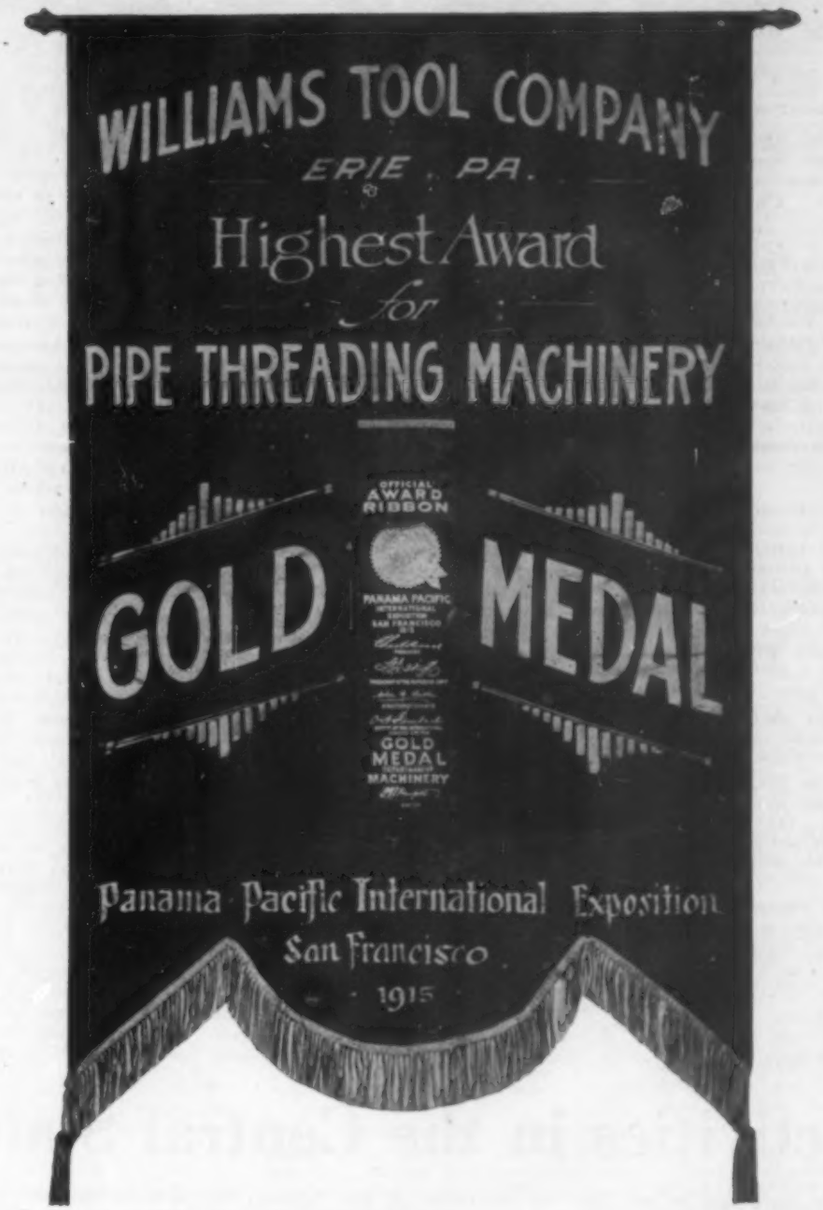
KEARNY, N. J.—The Ford Motor Car Co. has retained Albert Kahn, architect, 58 Lafayette avenue, Detroit, to prepare plans for a plant to be erected on the company's site at Kearny, to cost $1,000,000.

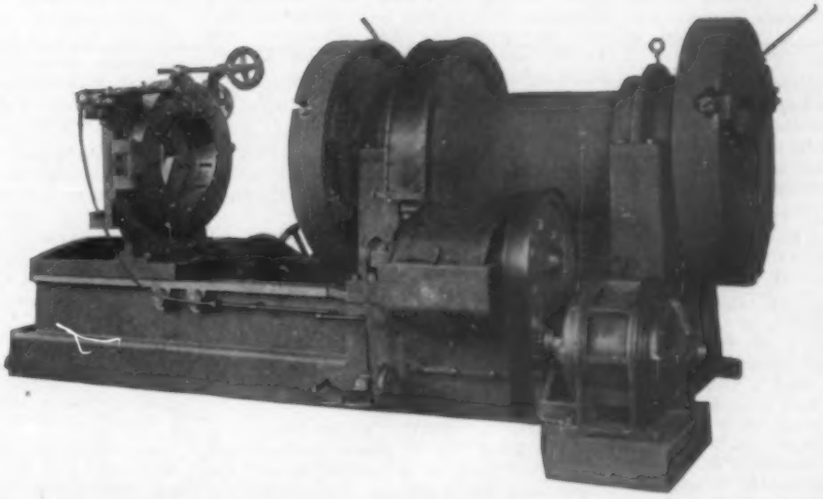
NEWARK, N. J.—The Hanson Van Winkle Co. has taken out a permit for 3-story brick factory on Malvern street to cost $12,700.

NEWARK, N. J.—The Splitdorf Electrical Co has let a contract for the construction of a 1-story, 48 x 55-foot power plant.

NEWARK, N. J.—Wiegand & Co., jewelers' findings, are taking estimates on a 2-story, 26 x 150-foot plant it proposes to build on Springfield avenue.

NEWARK, N. J. — The National Lock Washer Co., 65 Johnson street, will build





Say you saw it in THE IRON TRADE REVIEW

a rolling mill. The engineer is the Fletcher-Thomson Engineering Co., Bridgeport, Conn.

NEWARK, N. J.—The Hanson & Van Winkle Co. has let a contract for erecting a 3-story, 45 x 49-foot addition to its plant at Malvern and Van Buren streets. The company manufactures platers' supplies.

NEWARK, N. J.—The Harting Standard Gas Engine Co. has been incorporated with $25,000 capital to manufacture and sell motors and gas engines. The incorporators are Eyre Switzer, Horace C. Grice and Minnie F. Switzer, Newark.

PATERSON, N. J.—The Twentieth Century Gas, Oil & Chemical Co. has been incorporated to refine and manufacture oils. The company is capitalized at $100,000 by Samuel Kent, Morris Kent, Paterson, and Sol Blumenthal, New York.

PAULSBORO, N. J.—The Vacuum Oil Co., 61 Broadway, New York, has let contracts for erecting an oil refinery at Paulsboro to cost about $2,000,000. The engineer is R. N. Everett with offices at the company's plant in Bayonne, N. J.

PLAINFIELD, N. J.—Harris & Richards, architects and engineers, have awarded a contract to the Levering & Gerrigues Co., New York City, for erecting a machine shop for the Niles-Bement-Pond Co., at Plainfield. The structure will be of reinforced concrete, brick and steel, 1-story and 72 x 300 feet.

RAHWAY, N. J.—Merck & Co., manufacturers of chemicals, will build a 3-story and basement, 60 x 100-foot addition.

TRENTON, N. J.—The plant of John E. Thropp's Sons Co., founder and machinist, was damaged by fire with a loss of $20,000.

BETHLEHEM, PA.—The Silvox Co., manufacturer of spark plugs and springs, will build a factory at Bethlehem. The structure will be 60 x 315 feet, 1-story and basement. W. S. Barstow & Co., 50 Pine street, New York City, are the engineers.

CHESTER, PA.—The Philadelphia Electric Co. will build a power plant at Chester.

COLUMBIA, PA.—The Triumph Mfg. Co., maker of novelties, has let a contract for the erection of a 3-story, 45 x 60-foot plant.

ERIE, PA.—J. N. Chester, of Chester & Fleming, Pittsburgh, in his report to the city on improvements to water works, recommends the construction of a 10,000,000-gallon reservoir, the extension of water mains, the removal of pump at station and the installation of two pumps.

ERIE, PA.—H. Edsil Barr is preparing plans for a plant to be built at Jamestown, N. Y., at a cost of $35,000.

NEW CASTLE, PA.—The New Castle Paper Co. will make improvements to its plant on Nashanock avenue. Two boilers will be installed.

NEW CASTLE, PA.—The Pressed Steel Products Co. will erect a building 60 x 200 feet, to manufacture steel drums for use in shipping oil.

NEW CASTLE, PA.—The Johnson Bronze Co., formerly the American Car & Foundry Co., is planning further improvements to cost $85,000, including the remodeling of its old buildings, to be of steel and fireproof construction. Prack & Perrine, Pittsburgh, are the engineers.

PHILADELPHIA.—The Wm. R. Warner Co., chemist, 639 North Broad street, will build a 6-story, 180 x 200-foot plant, to cost about $300,000.

PHILADELPHIA.—The Geo. F. Ott Co. has been incorporated to manufacture machinery. The new company is capitalized at $5,000. John Limprum, 4017 North Sixth street, is the treasurer of the company.

PHILADELPHIA.—The Heisman Machinery Co. has been incorporated to manufacture machinery. The company is capitalized at $5,000. E. Ray Webb, spencer street, Brachton, Philadelphia, is the treasurer of the incorporation.

PITTSBURGH. — The Hackmeister Lind Chemical Co., 1910 Forbes street, plans to erect a 4-story building.

PITTSBURGH.—F. F. Nicola plans to build an 8-story apartment house at Forbes and Dithridge streets to cost $300,000. Rutan & Russell, Magee building, are the architects.

PITTSBURGH.—The county commissioners of Allegheny and Beaver counties will receive bids for constructing a reinforced concrete bridge over the Reardon run, on the Allegheny-Beaver county line.

PITTSBURGH. — The Standard Tubing Catcher & Supply Co. has been incorporated to manufacture appliances. The new company is capitalized at $50,000 by William Body, W. I. N. Lofland and George W. Morgan.

PITTSTON, PA. — The Eckenrode Bros., Wilkes Barre, Pa., have been awarded a contract for an addition to the Alpine Knitting Mills to cost $16,000. The addition will be three stories, 50 x 82 feet, brick and steel construction with a fire tower.

SCOTTDALE, PA.—The United States Cast Iron Pipe & Foundry Co. is taking bids for the erection of an extension to its plant.

SHARON, PA.—The Pressed Steel Products Co., a subsidiary of the Petroleum Iron Works Co., has started the erection of a 60 x 80-foot building to be used in the manufacture of steel drums for oil containers.

SHARON, PA.—The Franklin Mfg. Co. is making large extensions to its plant at Syracuse, N. Y., to consist of a structure to be used for general manufacturing and shipping room purposes. The cost of the improvement is estimated at $500,000 including machinery to be installed.

SOUTH BETHLEHEM, Pa.—The city council has voted $25,000 toward the erection of the Lehigh bridge at South Bethlehem.

YORK, PA.—The Charles E. Tucker Mfg. Co. has been incorporated to manufacture tools, gages, etc. The new concern is capitalized at $5,000, John F. Rudisill, York, is the treasurer of the company.

DOVER, DEL.—The Twin Tube & Rubber Co. has been incorporated to manufacture inner tubes and other rubber articles. The new company is capitalized at $1,000,000 by F. O. Buck, George W. Dillman and M. L. Horty, Wilmington, Del.

BALTIMORE.—The Hess Steel Co., Loney's line and Biddle street, will build transformer building.

BALTIMORE.—The Baltimore Enamel & Novelty Co. is having plans prepared by G. E. Painter, 324 North Charles street, for a 2-story and basement 128 x 300-foot addition, to cost $150,000.

WASHINGTON, D. C.—Sealed proposals will be received until Aug. 2 for the complete installation of an electric freight elevator and remodeling two passenger elevators in the United States custom house, New Orleans, according to specifications which may be obtained from the Washington office.

Activities in the Central States

AKRON, O.—Work has been begun on the erection of a $50,000, 4-story addition to the plant of the Akron Wholesale Grocery Co. on South College street. R. M. Pillmore is president of the company.

ASHTABULA, O.—The Ashtabula Leather Products Co. has been incorporated with $50,000 and will shortly begin the erection of two factory buildings at Pacific and East Harbor streets. The buildings will be concrete, 40 x 75, and 20 x 55 feet, with two stories.

BOWLING GREEN, O.—The Urschel Drop Forge Co. has been incorporated with $100,000 by B. H. Urschel, S. A. Canary, Alfred M. Place, C. B. Harding and J. W. Urschel.

BOWLING GREEN, O.—The Urschel Drop Forge Co. has been incorporated with $100,000 capital by D. H. and J. W. Urschel and others. The company has purchased a 2-acre site upon which it will erect a plant including a main building of steel construction, 125 x 45 feet, another building, 30 x 60 feet, and several smaller buildings. The machinery, already ordered, will be electrically driven and crude oil will be used as fuel in the plant.

CINCINNATI.—The following school buildings will be erected in this territory, for which heating, ventilating and power plant equipment have not yet been purchased: Dayton, O., grade and high school, to cost $30,000, and grade school, to cost $10,000; Elkhart, Ind., high school auditorium, to cost $30,000; Bedford, O., high school, to cost $30,000; Defiance, O., high school, to cost $35,000; Frederickson, O., high school, to cost $40,000; Gallipolis, O., high school, to cost $80,000; Grand Rapids, O., high school, to cost $40,000, and Jefferson, O., grade school, to cost $35,000.

GENEVA, O.—The Harvey System Silo Co. has been incorporated with $10,000 capital by George Harvey, Ashtabula, and will erect a plant for the manufacture of cement blocks.

VERA, O.—Estimates will be prepared by Engineer Arnold for the proposed 1,100-foot steel viaduct over the Baltimore & Ohio railroad tracks at the foot of West Fifth street.

NORWOOD, O.—The Fischer-Devore Co. has a contract for a 2-story, concrete and steel power plant to be erected between Edwards road and Edmonson avenue along the Norfolk & Western railroad for the R. K. LeBlond Machine Tool Co., Cincinnati. The building will cost $20,000.

PAINESVILLE, O.—The Perfection Tube Co. has been incorporated to manufacture automobile tubing. The company is capitalized at $100,000 by E. T. Hutches, James McSweeney, W. B. Drown, E. B. Kimmel and J. I. English.

TOLEDO, O.—An addition to cost $20,000 is being erected at the plant of the Kent-Owens Co. on Libbey street. The new structure will be of fireproof, steel construction.

WEST CARROLLTON, O.—A 4-story, 40 x 80-foot factory building will be built by the American Envelope Co. Bids are being taken. The special equipment required has not yet been purchased.

YOUNGSTOWN, O.—The American Sintering Co. has awarded Stone & Webster, Youngstown, contract for the erection of a plant on Poland avenue, near the Lake Erie & Eastern tracks, to cost $100,000.

CHARLESTON, W. VA.—The county court will receive bids for constructing a steel highway bridge, with concrete foundations across the Elk river near Queen Shoals, between

Kanawha and Clay counties. F. G. Burdett, Kanawha county, is county road engineer.

FAIRMOUNT, W. VA.—A hotel to cost $400,000 will be erected by the Fairmount Hotel Co. Heating and power plant equipment contracts will be let. The steel framework contract has been let to the Newman Blacksten Co., Washington, D. C.

MIDDLEBOURNE, W. VA.—The county clerk will receive bids for constructing a reinforced concrete arch bridge over the Middle Island creek.

ANDERSON, IND.—The Seften Mfg. Co. has awarded a contract to the Jungelas Construction Co., Indianapolis, for the addition of an $18,000 building to the local plant.

CHESTERTON, IND.—The Chesterton Iron Works has been incorporated with $25,000 capital to manufacture tanks of steel, iron and other metals. The new company is incorporated by Charles F. Remmert, Charles R. Folsom and Mamie Folsom.

FRANKFORT, IND. — The Indiana Brass Works is building a melting room, 43 x 105 feet, for which new equipment will be required.

GARY, IND.—J. M. Mayfield, Topeka, Kan., president of the Mayfield Hydraulic Motor Mfg. Co., capitalized at $5,000,000, visited Gary, looking for a location for a plant which will cover about 40 acres and give employment at the start to about 1,200 men. The company proposes to manufacture hydraulic motors.

INDIANAPOLIS, IND. — The Oakes Co., manufacturer of automobile parts, is building an addition to its plant at Wheeler & Roosevelt streets, to cost $25,000.

INDIANAPOLIS, IND.—The Motor Specialty Co. has been incorporated to manufacture automobile parts; the company is capitalized at $10,000, by Theodore Rees, N. H. Wible and Arthur E. Johnson.

INDIANAPOLIS, IND.—A hotel to cost $100,000 will be built by the Gill Buennable Realty Co. Heating, ventilating and power plant equipment and structural steel will be required. Plans have not yet been completed. Charles H. Byveld is the architect.

KOKOMO, IND.—A factory building, 80 x 144 feet, will be built by the Oscillating Electric Fan Co. Plans have not yet been completed.

LA PORTE, IND.—The La Porte Furnace & Foundry Co. is building a foundry, 50 x 200 feet, to cost $8,000.

LA PORTE, IND.—The Auto Power Co. has been incorporated to manufacture automobile parts. The company is capitalized at $25,000 by L. Darrow, E. L. Van Dolsen and L. H. Russell.

AURORA, ILL.—Contracts will be let in August for two bridges to cost $70,000, each consisting of three 51-foot skew spans with a 34-foot roadway. M. J. Tarble is the city engineer.

CHICAGO.—The Great Western Smelting & Refining Co. will build a 1-story foundry at 600 West Forty-first street, to cost $50,000.

CHICAGO.—The Lawrence Mfg. Co., manufacturer of machinery, will occupy a 7-story building to be erected at Franklin and Superior streets, at a cost of $15,000.

CHICAGO.—The Cummings Foundry Co., 1338 Cortland street, will build a 1-story, brick and steel, foundry addition, 75 x 100 feet, to cost $10,000.

CHICAGO.—The Atlas Copper & Brass Mfg. Co. has been incorporated to take over part of the plant of the Goetz Co., 1802 Claybourn avenue. The new concern is capitalized at $5,000 by Wm. H. Bees, H. L. Woodruff and Albert Beerhide.

CHICAGO.—Bids will be received during July, by W. R. Moorhouse, commissioner of public works, 406 city hall, for a steel, double-deck, bascule bridge at Wells street, a double-leaf steel, trunnion, bascule bridge at Clark street and a steel bascule bridge at Franklin and Orleans streets.

DECATUR, ILL.—The Decatur Iron Co. has been incorporated with $100,000 capital by A. W. Wagner, E. V. Wierman and John M. Byrne.

EAST ST. LOUIS, ILL.—The American Carbon & Battery Co., manufacturer of electrical supplies, plans to build an addition.

FOX LAKE, ILL.—A steel or concrete bridge to cost $35,000 will be build over the Pistakee and Neppersink channel. C. Russell, engineer, Waukegan, Ill., is in charge of the work.

LITCHFIELD, ILL.—The Joseph F. Wangler Boiler & Sheet Iron Works, St. Louis, is planning to establish a plant at Litchfield.

SPRINGFIELD, ILL.—The Shanklin Mfg. Co., manufacturer of brass novelties, will build a factory, 50 x 180 feet, costing $10,000.

BAY CITY, MICH.—The Saginaw Bay City Traction Co. has purchased property at Saginaw and Sixth streets, upon which they will erect an interurban terminal.

BAY CITY, MICH.—An office and machine shop building will be built by the Zagelmyer Cast Stone Block Machine Co. The structure will be 60 x 235 feet and one-story. Bids for equipment are being taken.

BENTON HARBOR, MICH.—H. S. Graves, attorney, is president of a company which has acquired a 100-acre site upon which it will erect a plant for washing, screening, sorting and grinding gravel.

DETROIT.—The Detroit Stove Works is building a factory to cost $25,000 at 1320 East Jefferson street.

DETROIT.—The stockholders of the Detroit Iron & Steel Co. have ratified a proposal to add another unit to the blast furnaces of

Chips from the Machine

The Calhoun Pattern Foundry & Machinery Co., Houston, Tex., has been purchased by R. P. Clark, Galveston, Tex., for $20,000.

* * *

The American Brass Foundry Co., Milwaukee, will move from its present quarters at 198-202 Milwaukee street to larger quarters at 1916 St. Paul avenue, recently vacated by the Universal Machinery Co. The old site will be remodeled for occupancy by the Allis Fire Extinguisher Co., 434 Jefferson street.

* * *

The county board of supervisors, Milwaukee, will conduct a competition among the architects for securing plans for the new $2,500,000 court house to be located on Grand avenue between Tenth and Eleventh streets.

* * *

The Four Wheel Drive Auto Co., Clintonville, Wis., has completed a rush shipment of thirty-three automobiles for use on the Mexican border by the United States army.

* * *

The American Manganese Bronze Co., Holmesburg, Pa., manufacturer of bronze ingots, castings, forgings, sheets, rods and extruded shapes, will also manufacture propellers.

* * *

The Builders' Iron Foundry, Providence, R. I., has purchased the property of the Norcross Bros. Co., Worcester, Mass., at Kinsley and Sims avenues, and will remodel it for its business.

* * *

The Eagle White Lead Co., Cincinnati, has changed its name to the Eagle Picher Co.

* * *

The Geschwind Furnace Co., Youngstown, O., has purchased the Day Dard Ward plant at Dana and North Park avenue, Warren, O., and will move its business to Warren.

* * *

The W. H. Fetters Co., Plymouth, O., will move its business to Bellevue, O., and resume operations in connection with the Klein Iron & Steel Co., Bellevue.

* * *

An injunction has been filed against the Goodyear Tire & Rubber Co., Akron, O., restraining it from erecting a $3,800,000 building on Seventh avenue.

The Barnes & Roberts Mfg. Co. has increased its capital stock from $200,000 to $500,000 and has changed its name to the B. & K. Mfg. Co.

* * *

The United States Cartridge Co., Lowell, Mass., has leased 30,000 square feet of floor space in the Bigelow-Hartford carpet mill.

* * *

The American Bridge Co., East Berlin, Conn., is removing its large forge shop to Ansonia, Conn.

* * *

The Inter-State Machine Co., New London, Conn., has changed its name to the Inter-State Products Co.

* * *

The Electrical Alloy Steel Co., Chicago, has changed its name to the Trojan Electrical Steel Co.

* * *

The Henry Vogt Machine Co., Louisville, Ky., has had an automatic sprinkler system of 5,000 sprinkler heads installed in its plant by the Rockwood Sprinkler Co.

* * *

The Love Iron Foundry Co., Winchester, Ky., will move its business to Lexington, Ky.

the company at an approximate cost of $1,000,000.

DETROIT.—The Standard Fuel Appliance Co., 1267 Beaufeir avenue, is making additions to its plant. Heat-treating furnaces are the products.

DETROIT. — The Detroit Seamless Steel Tube Co. has purchased an 11-acre site at West Fort and Boyd streets upon which it will erect a plant to cost several hundred thousand dollars and to contain 400,000 square feet of floor space.

ESCANABA, MICH.—The board of public works awarded a contract to the Stacey Bros. Co., Cincinnati, for a new gas holder for the municipal gas plant at a cost of $12,500. The tank will have a capacity of 100,000 cubic feet.

GRAND HAVEN, MICH. — The Johnson Brothers Boiler Works, recently burned with a loss of $30,000, is to be rebuilt.

JACKSON, MICH.—The Michigan Central Railway Co., George H. Webb, chief engineer, Detroit, is planning to spend $250,000 for additions to its shops at Jackson Junction.

MUSKEGON, MICH.—The Lakeside Foundry Co. has purchased property in Muskegon and will erect a factory upon it in the near future.

BURLINGTON, WIS.—The Nelson & Bradford machine shop has been opened at Burlington by Chester Bradford and John L. Nelson, Racine, Wis., who have leased the Wagner machine shop and are installing much new equipment. All kinds of machinery and boiler work will be undertaken.

CHIPPEWA FALLS, WIS.—The Chippewa Foundry & Machine Co. will erect a new building upon a site recently purchased. The company is reorganizing with a capital of $100,000 and will manufacture pumps.

CORLISS, WIS.—The Corliss Motor Truck Co. has been incorporated with a capital of $100,000. The organization is not yet complete.

FOND DU LAC, WIS.—The Gurney Refrigerator Co. has awarded contracts for the construction of a 4-story addition, 60 x 80 feet, which will cost in excess of $25,000 including equipment.

GREEN BAY, WIS.—The Fabry Construction Co. has taken a general contract for the erection of a sulphite mill group for the Northern Paper Mills Co., Green Bay. The new plant will consist of one 5-story, two 2-story, three 1-story buildings, and three 100-foot towers. All of the structures will be brick, concrete and steel.

MARINETTE, WIS.—The Michigan Electrochemical Co. has been incorporated, with $150,000 capital. A plant will be established in Menominee, Mich., at once to manufacture alkaline and chlorine chemicals. A. R. White, Marinette, is secretary.

MILWAUKEE.—The Wisconsin Welding & Cutting Co. is building an addition to its plant at 315 Fourth street.

MILWAUKEE.—The General Welding & Mfg. Co. will build a brick manufacturing plant, 35 x 83 feet, 1-story, at Oregon and Greenbush streets. Charles J. Keller, Germania building, is the architect.

MILWAUKEE.—The Marquette University, Milwaukee, has been granted a permit to build a $12,000 addition to the college of engineering, 1136 Sycamore street. J. C. Davis is dean.

MILWAUKEE.—C. H. Krebs, 751 Downer avenue, inventor of a freight car heater, has organized the Everburn Heater Co., with $20,000 capital and will establish a factory. A. J. Mayer and L. A. Olwell, attorneys, with Mr. Krebs are the incorporators.

MILWAUKEE.—Leehouts & Guthrie, architects, have revised plans for a chair factory unit for the new Milwaukee county house of correction, to cost $80,000. The main shop will be of reinforced concrete and brick, 62 x 243 feet, two stories and basement. Bids will be taken soon by Louis G. Widule, county clerk.

MILWAUKEE.—The W. J. Hoy Co., St. Paul, Minn., has taken a contract for erecting a $350,000 hotel, theater and office building for the Fred Miller Brewing Co., at 171-175 Third street, Milwaukee. It will be 100 x 150 feet, four and nine-stories, of reinforced concrete and brick. Wolff & Ewens are the architects.

RACINE, WIS.—The Modine Mfg. Co. has been incorporated with a capital of $200,000 by A. B. Modine, L. M. Lunn and P. J. Meyers.

RACINE, WIS.—The Mueller-Kuehn Co. will erect a $50,000 cold storage and wholesale grocery warehouse at 1332-1338 Liberty avenue. The proposed structure will be three stories, 60 x 180 feet, of reinforced concrete and brick. E. B. Funston is the architect.

RACINE, WIS.—A private garage and machine shop costing $35,000 will be erected by the Horlick's Malted Milk Co., Racine. Plans prepared by G. L. Lehle, architect, 3739 Pine Grove avenue, Chicago, call for a 2-story, 69 x 154-foot reinforced concrete, brick and steel structure.

SUPERIOR, WIS.—The Continental Motor Truck Co., J. G. Barnsdale, secretary, has awarded contracts for erecting its new factory on Belknap street. It will be 80 x 200 feet, reinforced concrete, steel and brick.

SUPERIOR, WIS.—Articles of incorporation have been filed by the Superior Consolidated Copper Co. The capital stock is $500,000 and the incorporators are M. A. Lee, A. S. Andrews and C. E. Cole, all of Superior.

WASHBURN, WIS.—Fire badly damaged the machine shop and logging railway headquarters of the Edward Hines Lumber Co., of Chicago, at Casson, near Washburn. A large number of metal and woodworking machinery and tools, and five locomotives were ruined.

WEST ALLIS, WIS. — The Milwaukee Stamping Co., Sixty-fourth and Pullen street, is planning to build an addition, 72 x 122 feet, at a cost of $15,000. The company manufactures hardware specialties.

KANSAS CITY, MO.—The city of Kansas City will install a turbine engine at its waterworks plant, to cost over $100,000. H. P. Jackson is the superintendent.

ST. LOUIS.—The American Water Heater Co., recently incorporated, will equip a factory for manufacturing water heaters.

ST. LOUIS.—The Triangle Smelting & Refining Co. has been incorporated with $2,000 capital by George Newfeld, Fannie Newfeld and Meyer Brockman.

ST. LOUIS.—The Alex Kilpatrick & Sons Foundry Co. has purchased a large tract of land in North St. Louis upon which it will build an extensive plant. The Mineral Refining & Chemical Corporation has leased a 54-acre site south of the River des Peres along the Missouri Pacific-Iron Mountain railroad upon which it will build a $2,000,000 plant.

VALLEY PARK, MO.—The Barks & Barstow Mfg. Co., maker of steel roofing and specialties, will build a plant at Valley Park.

MARSHALLTOWN, IA.—The Fisher Governor Co., manufacturer of machinery and steam pumps, is having plans prepared for a 2-story factory.

DULUTH.—The Duluth Brass Works will build an addition to its foundry, 50 x 80 feet, to cost $8,000.

MINNEAPOLIS, MINN.—The Western Crucible Steel Castings Co. is planning to erect an addition to cost $50,000.

In the South and Around the Gulf

PULASKI, VA.—The Pulaski Foundry & Machine Co., Robt. Bunts Jr., president, is preparing plans for erecting two 1-story foundry buildings, each 40 x 130 feet.

SPOTTSYLVANIA, VA.—The Virginia Lead & Zinc Co., J. S. Grasty, engineer and general manager, Jefferson bank building, Charlottsville, Pa., contemplates the erection of a concentrating mill at Spottsylvania.

CHATTANOOGA.—The Chattanooga Brass & Machine Co. has been incorporated with $15,000 capital by W. L. Case, Carl Flatter and W. F. Norman.

MEMPHIS, TENN.—The Southern Iron & Metal Co. has applied for a charter. The new company will be capitalized at $3,000 by L. Nord, B. Singer, Lee Rome, Nathan Lindy and Bertha Singer.

BLOOMINGTON, KY.—A bond issue of $62,000 has been voted for the construction of a municipal water system. Information may be obtained from the mayor.

FARMERS, KY.—The Rowan County Freestone Co. is in the market for a carload of soft steel, stone saw blades, cutting lengths, 11 feet 8 inches, 13 feet 8 inches and 17 feet 8 inches, width, 3½ to 4½ inches and thickness, ⅛ to 5/32-inches.

LEXINGTON, KY.—W. H. McCorkle, commissioner of public works, proposes the construction of two storage tanks for road oil, to contain 10,000 and 12,000 gallons, respectively.

LOUISVILLE, KY.—The Ohio Valley Mfg. & Sales Co. has been incorporated with $30,000 by Henry W. Rahm, Lee Rahm and W. P. Buzzaird.

LOUISVILLE, KY.—James McWilliams & Co., manufacturers of heating plants, have incorporated with $12,000 capital. The incorporators are James McWilliams, Kelly F. Miles and F. L. McWilliams.

BATESVILLE, ARK. — J. J. Johnson, Batesville, Ark., will establish a plant to manufacture hay presses at Batesville.

YELLVILLE, ARK.—J. E. Lee, Ross Lee and J. F. Green, Springfield, Mo., will build a foundry and machine shop at Yellville.

ARANSAS PASS, TEX.—The Alamo Iron Works, San Antonio, has purchased three acres and is planning to build a fabricating plant at Aransas Pass.

DALLAS, TEX.—The Texas Iron Metal Co. is planning to build a foundry, costing $15,000 at Dallas.

HOUSTON, TEX.—F. C. Lane, 1117 Prairie avenue, will establish a foundry and plant to manufacture brass castings at Houston.

HOUSTON, TEX.—The Houston Car Wheel & Machine Co.'s pattern shop and brass foundry was damaged by fire with a loss of $93,000.

VAN ALSTYNE, TEX.—The city of Van Alstyne plans to build a pumping station.

BESSIE, OKLA.—Bonds for $25,000 have been voted for the construction of a waterworks system.

Western and Intermountain Territory

ATCHISON, KAN.—The Cooper Foundry Co. will build a plant, 48 x 60 feet. The concern has been organized recently with Charles Cooper, St. Joseph, Kan., president.

MORAN, KAN.—The city of Moran is planning to build a waterworks plant, costing $25,000. W. B. Rollins & Co. Kansas City, Mo., are the engineers.

TOPEKA, KANS.—Bids will be received soon by O. K. Swayne, city clerk, for six steel spans, 50 x 100 feet long, to cost $55,000.

MINEOLA.—The city of Mineola is planning to build a municipal electric light plant and waterworks system, at a cost of $25,000.

OMAHA, NEB.—The Omaha Steel & Construction Co. has been incorporated to erect steel and concrete bridges. The new concern is capitalized at $10,000 by F. R. Johnson, H. B. Mayo and W. J. Dobbs.

WAHOO, NEB.—George W. Johnson, state engineer, is preparing plans for a bridge over the Platte river, to cost $100,000.

YUTAN, NEB.—The state and county plan to build a bridge over the Platt river, to cost $97,000.

HOWARD, S. D.—Bonds for $25,000 have been voted for improvements to the municipal electric light plant at Howard.

PACTOLA, S. D.—The Dakota Power Co., Rapid City, is planning to build a dam at Pactola, at a cost of $1,000,000.

LA MOURE, N. D.—The county commissioners of La Moure and Dickey counties, will build a steel bridge, 2,100 feet long, over the James river on the county line. O. C. Temple, is the auditor of La Moure county.

BILLINGS, MONT.—C. E. Hall, Seattle, is interested in the Cinnebar mines, at Billings. New machinery is to be installed.

DILLON, MONT.—The commissioners of Beaverhead and Silverbow counties will build a steel bridge over the Big Hole river near Ralston, to cost $12,000. W. T. George, of Dillon, is the engineer of Beaverhead county.

HIGHWOOD, MONT.—A waterworks plant is to be built at Highwood, including a 90-gallon per minute pump to operate against 175-foot head and a 30,000-gallon reservoir, to cost $12,000. The Gerhorz & Jaqueth Engineering Co., Great Falls, Mont., is the engineer.

HINSDALE, MONT.—The Valley county board of commissioners, at Glasgow, will ask bids soon for a waterworks system including a pumping station with equipment and an electric light plant at Hinsdale. W. H. Mann, Glasgow, is the county engineer.

SHERIDAN, MONT.—Bonds for $26,000 have been voted for waterworks construction. Frank Carey is the town clerk.

VANDALIA, MONT.—The Vandalia Machine & Welding Works is building a machine shop and foundry. Daniel McKay, of Glasgow, Mont., is in charge of the work.

GUERNSEY, WYO.—C. A. Guernsey is interested in a dam and hydro-electric plant on the Platte river to cost $250,000.

GUNNISON, COL.—The county will build a steel bridge, 110 feet long, over the Gunnison river. R. L. Leboell is the county clerk.

COEUR d'ALENE, IDA.—An ordinance has been passed providing for a bond issue of $280,000, for a municipal waterworks and lighting system. O. W. Edmunds, is the clerk.

McCAMMON, IDA.—A contract will be let soon by the public utilities commission for a waterworks system to cost $22,000, including a 50,000-gallon tank on a 90-foot tower.

WALLACE, IDA.—Plans are being prepared for a 10-stamp mill at the Rose Consolidated mine near Libby, Mont.

WALLACE, IDA.—City Engineer Merriam is preparing plans for an ornamental iron bridge acros the south fork of the Coeur d'Alene river.

Pacific Coast and Western Canada

LOS ANGELES, CAL.—The city council will spend $482,000 for bridges and flood control in San Fernando county.

PETALUMA, CAL.—The Corliss Gas Engine Co. is planning to enlarge the plant of the Petaluma Foundry Co., which it recently purchased.

SANTA BARBARA, CAL.—Plans for a bridge to cost $50,000 at Quemade are being prepared by Mayberry & Parker, engineers, 1018 State street, Santa Barbara.

VISALIA, CAL.—The Mt. Whitney Power &Electric Co. is planning to build a high-tension transmission line to Exeter, at a cost of $30,000. H. A. Kluegel is the chief engineer in charge of the work.

ABERDEEN, WASH. — The Harrington-Peters Co., Oriental building, Seattle, is low bidder at $225,000 for the construction of the proposed water system for the city of Aberdeen. L. D. Kelsey is the city engineer.

EVERETT, WASH.—The council has awarded a contract for constructing a new waterworks system at Everett to the Washington Paving Co., L. C. Smith building, Seattle, at a cost of $473,000. About 23,000 feet of 28-inch steel pipe will be required in the work.

MONTESANO, WASH. — A contract has been awarded to William Monson, Portland, for the construction of a 189-foot steel span bridge over the Humtulips river at a cost of $16,582.

NORTHPORT, WASH.—The city council of Northport is considering plans for a municipal electric light plant and waterworks, costing $25,000.

SEATTLE.—The American Can Co. will build a 5-story plant, 120 x 240 feet, costing $150,000.

SEATTLE.—The Winton Motor Car Co. will build a garage, 120 x 120 feet, to cost $65,000. H. Ryan, Northern bank building, is the architect.

SEATTLE, WASH.—The board of public works has awarded a $11,146 contract for furnishing steel and iron for the spans in the approaches to the Salmon Bay bridge crossing the Lake Washington canal at Fifteenth avenue, to the Hofius Steel & Equipment Co.

SEATTLE. — The Olympic Metals Co. has been incorporated with $20,000 capital by W. O. Witherspoon, H. R. Sanderson, H. H. Warner and A. C. Warner.

SEATTLE.—The Pacific Foundry & Machinery Co. has been incorporated with $500,000 by J. L. McDonald, H. S. Hendrickson and Frank S. Paul.

SEATTLE.—The Chicago Bridge & Iron Works has been awarded a contract for a steel tower to be erected at Rainier beach, at Seattle, to cost $27,940.

SEATTLE.—City Engineer Dimock and Superintendent of Water Youngs, have made recommendations in a report recently filed, recommending the expenditure of $8,183,000 for improvements in the present water system. The estimated cost of improvements is as follows: Concrete conduit, from Lansberg to Swan lake, including the rebuilding of the intake, $573,000; development of Swan lake including an aqueduct to Molasses creek, $777,000; replacing pipe-line No. 1 with a steel line, $625,000; replacing pipe-line No. 2 with a steel line, $1,180,000; steel pipe-line No. 3 from Molasses creek to West Seattle, $1,650,000; steel pipe-line No. 4 from Molasses creek to West Seattle, $1,650,000; steel pipe-line No. 4 from Molasses creek to Volunteer park, $1,600,000.

SPOKANE, WASH.—Remodeling of the Keller smelter is under consideration by the owners. Alterations in the electro-chemical plant will cost $70,000.

SPOKANE, WASH.—The county commissioners are planning to erect a 200-foot steel bridge over the Spokane river at a cost of $20,000. J. W. Strack is the county engineer.

SPOKANE, WASH.—The American Shipbuilding Co. has been incorporated with $1,500,000 capital, by H. B. Spear, president and general manager; R. C. Sweatt, vice president, and J. B. McCoy, secretary and treasurer. It plans to build a ship building plant on Puget Sound, including a ship shed, blacksmith shop, machine shop, foundry and wood working shop.

TACOMA, WASH.—John L. Roberts, president of the Puget Sound Iron & Steel Works, announces that the pattern shop, which was damaged by fire recently with a loss of $250,000, will be rebuilt.

TACOMA, WASH.—Bullard & Hill, architects, Tacoma building, Tacoma, have been commissioned by the Pacific Boiler Co., Tacoma, to prepare plans for another addition to its plant at 549 Dock street. The addition will be 50 x 80 feet.

HUNTINGTON, ORE. — A contract for constructing a $40,000 roundhouse for the Oregon-Washington Railroad & Navigation Co. has been awarded to the M. J. Hursen Co., Globe building, Seattle.

LA GRANDE, ORE.—The Oregon-Washington Railroad & Navigation Co. has awarded contract for the construction of three steel bridges to the Robert Wakefield Co., Portland.

PORTLAND, ORE. — Martin & Dugan, Seattle, who were awarded a contract for erecting the radio towers at Keyport, Wash., have placed a $35,000 order for structural steel with the Northwest Steel Co., Portland.

PORTLAND, ORE.—Bids will be received at the office of the supervising architect, Washington, D. C., until August 7, for the construction of a 2-story steel frame and reinforced concrete postoffice for the city of Portland, to cost about $1,000,000. Louis P. Hobert, Crocker building, San Francisco, is the architect.

PORTLAND, ORE.—The recently incorporated Motorship Construction Co. is closing a deal for a site for new ship yards on the river at Portland. It is reported that this concern has closed contracts to build four motor-driven schooners, to be 250 feet long, 44 feet beam and 22 feet depth, twin-screw with two 320-horsepower diesel engines. The total cost of the four boats is given at $548,000.

STEELTON, B. C.—The Algoma Steel Corporation is building a shell-cutting plant at a cost of $12,000.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Lower price to Jan. 1, 1917; higher to July 1, 1917.)

Bessemer valley	$21.00 to 21.50
Bessemer, Pittsburgh	21.95 to 22.45
Basic, Pittsburgh	18.95 to 19.20
Basic, eastern Pa.	19.00 to 19.50
Basic, Buffalo	19.00 to 19.50
Malleable, Pittsburgh	19.45 to 19.95
Malleable foundry, Chicago	19.50
Malleable foundry, Philadelphia	21.50 to 21.75
Malleable foundry, Buffalo	18.50 to 19.00
No. 1X foundry, Philadelphia	20.25 to 20.75
No. 2 foundry, Pittsburgh	19.45 to 19.70
No. 2 foundry, Cleveland	18.80 to 19.30
No. 2 foundry, Ironton	18.00 to 19.00
No. 2 foundry, Chicago	19.00
No. 2X foundry, Philadelphia	19.75 to 20.25
No. 2X foundry, N. J. tidewater	19.75 to 20.25
No. 2X foundry, Buffalo	18.50 to 19.00
No. 2 plain, Philadelphia	19.25 to 19.75
No. 2 plain, N. J. tidewater	19.25 to 19.75
No. 2 plain, Buffalo	18.25 to 18.75
No. 2 southern, Birmingham	14.00 to 15.00
No. 2 southern, Cincinnati	16.90 to 17.90
No. 2 southern, Chicago	18.00 to 19.00
No. 2 southern, Phila. delivery	19.00 to 19.50
No. 2 southern, Cleveland	18.00 to 19.00
No. 2 southern, New York docks	18.00 to 18.50
No. 2 southern, Boston docks	18.25 to 18.75
No. 2 south. interior, New Eng.	19.00 to 20.00
No. 2 southern, St. Louis	18.40 to 18.90
Virginia No. 2X, furnace	18.50 to 19.00
Virginia 2X, Philadelphia	21.25 to 21.75
Virginia, No. 2X, Jersey City	21.00 to 21.50
Virginia 2X, Boston points	21.75 to 22.25
Gray forge, eastern Pa.	19.00 to 19.50
Gray forge, Pittsburgh	18.95
Gray forge, Birmingham	13.00 to 14.00
Silveries, 8 per cent, furnace	25.00 to 27.00
Silveries, 8 per cent, Chicago	31.50
Low phos. Standard, Phila.	32.00 to 34.00
Low phos. Lebanon, Pa. furnace	29.00 to 31.00
Low phos. Pittsburgh	30.00 to 31.00
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	19.75 to 22.25
Charcoal, Buffalo	21.00 to 22.00
Charcoal, Birmingham	22.50 to 23.00

IRON ORE

Lake Superior Ores.
(Lower Lake Ports.)

Old range Bessemer, 55 per cent, ton	4.45
Mesabi Bessemer, 55 per cent, ton	4.20
Old range non-Bess., 51½ per cent, ton.	3.70
Mesabi non-Bess., 51½ per cent, ton.	3.55

Eastern Ores.
(Per unit delivered eastern Pennsylvania.)

Pt. Henry fur., 60 per cent, unit	8.5c to 8.9c
Local N. Y. and N. J. ores, unit	8.5c to 8.75c
Port Henry lump, at mines, ton.	$4.00

Foreign Ores.
(Per unit Philadelphia.)
(Prices nominal.)

Foreign Bess., 50 to 65 per cent	8 to 8½
For'n non-Bess., 50 to 65 per cent	8 to 8½

COKE

(At the ovens.)

Connellsville furnace	$2.50 to 2.65
Connellsville fur., contract	2.50
Connellsville foundry, contract	3.15 to 3.40
Connellsville foundry	3.00 to 3.25
Wise county furnace, contract	2.85 to 3.25
Wise county foundry, contract	3.50 to 3.75
Pocahontas foundry, contract	3.25 to 3.75
Pocahontas furnace, contract	2.85 to 3.25
New River foundry, contract	3.75 to 4.25
New River furnace, contract	3.25 to 3.50

FERRO ALLOYS AND STEEL MAKING METALS

Ferro manganese, 80 per cent, seaboard, prompt	$175 to 200
Ferro manganese, 80 per cent, seaboard, contract	175
Spiegel, 20 per cent, fur. early and last half	50.00 to 55.00
Ferro-silicon, 50 per cent, Phil.	83.00 to 85.00
Ferro-silicon, 50 per cent, Pbgh.	83.00 to 85.00

Bessemer ferro-silicon, 9 per cent to 10 per cent, $32.00; 10 to 11 per cent, $33.00; 11 to 12 per cent, $34.00; 12 to 13 per cent, $35.00 a ton at the furnace at Ashland, Jackson and New Straitsville, O.

Ferro-carbon titanium, 8 to 12½ cents per pound in carloads.

SEMI-FINISHED MATERIAL

Open hearth billet, Phila.	$45.00 to 50.00
Forging billets, Phila.	65.00 to 70.00
Forging billets, Pbgh., nominal.	65.00 to 70.00
Forging billets, Chicago	65.00
Wire rods, Pittsburgh (nom.)	60.00 to 65.00
Bessemer billets, Youngstown	40.00 to 45.00
Bessemer billets, Pittsburgh	40.00 to 45.00
Open hearth billets, Pittsburgh	40.00 to 45.00
Open hearth billets, Youngstown	40.00 to 45.00
Bess. sheet bars, Youngstown	40.00 to 45.00
Op. h'th sheet bars, Youngstown	40.00 to 45.00
Bess. sheet bars, Pittsburgh	40.00 to 45.00
Open hearth sheet bars, Pbgh.	40.00 to 45.00
Muck bars, Pittsburgh (nominal)	40.00 to 45.00

SKELP

Grooved steel skelp	2.50c
Sheared steel skelp	2.75c

RAILS AND TRACK MATERIAL

(Gross tons.)

Stand. Bess. rails, Pbgh. & Chg. delivery after May 1, 1917	$33.00
Stan. op.-h'th rails, Pbg. & Chg. delivery after May 1, 1917	35.00
Light rails, 8 to 10 lbs., Pbgh.	50.00
Light rails, 8 lb., Chicago	43.00
Light rails, 12 to 14 lbs., Pbgh.	49.00
Light rails, 12 lbs., Chicago	42.00
Light rails, 16 to 20 lbs., Pbgh.	48.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—	
Cleveland	$0.95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18
Buffalo to:—	
Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail)	2.58
New York and Brooklyn (by canal)	1.25 to 1.60
Virginia furnaces to:—	
Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York, (r. and w.)	4.25
Philadelphia (all rail)	5.20
Philadelphia (r. and w.)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago to:—	
Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

Light rails, 16 to 20 lbs., Chgo.	$41.00
Light rails, 25 to 45 lbs., Pbgh	47.00
Light rails, 25 to 45 lbs., Chgo.	40.00
Relaying rails, standard, Pbgh. and Chicago	$23.00 to 24.00
Relaying rails, light, Chicago	24.00 to 25.00
Angle bars, st. sect., Pbgh. base	2.00c
Angle bars, st. sections, Chgo.	2.00c to 2.50c
Spikes, railroad, Pittsburgh	2.65c to 2.75c
Spikes, railroad, Chicago	2.75c to 2.90c
Track bolts, Pittsburgh	3.25c to 3.50c
Track bolts, Chicago	3.25c to 3.50c
Tie plates, Chicago	50.00 to 55.00

SHAPES, PLATES AND BARS

Structural shapes, Pbgh.	2.50c to 2.75c
Structural shops, Philadelphia	2.659c to 2.909c
Structural shapes, Chgo.	2.69c to 3.29c
Structural shapes, New York	2.669c to 2.919c
Tank plates, Chgo.	3.09c to 3.49c
Tank plates, Pittsburgh (con.)	2.75c to 2.90c
Tank plates, Pittsburgh	3.00c to 4.25c
Tank plates, Philadelphia	2.909c to 3.909c
Tank plates, New York	2.919c to 3.919c
Bars, soft steel, Chicago	2.69c to 3.29c
Bars, soft steel, Pbgh.	2.50c to 2.75c
Bars, soft steel, New York	2.669c to 2.916c
Bars, soft steel, Philadelphia	2.659c to 2.905c
Hoops, carloads, Pittsburgh	2.75c to 3.00c
Bands, Pittsburgh	2.50c to 2.75c
Shafting, Pbgh., contr. carloads	10 to 20 off
Bar iron, Chgo.	2.35c to 2.50c
Bar iron, Philadelphia	2.559c
Bar iron, Cleveland	2.40c
Bar iron, New York	2.569c
Bar iron, Pittsburgh	2.65c to 2.75c
Hard steel bars, Chgo.	2.50c to 2.75c

SHEETS AND TIN PLATE

Bessemer.

BLUE ANNEALED SHEETS PITTSBURGH

	Per lb.
Nos. 3 to 8	2.95c to 3.20c
Nos. 9 to 10	3.10c to 3.35c
Nos. 11 and 12	3.15c to 3.40c
Nos. 13 and 14	3.20c to 3.45c
Nos. 15 and 16	3.30c to 3.55c

Bessemer.

BOX ANNEALED SHEETS, COLD ROLLED PITTSBURGH

Nos. 17 to 21	2.70c to 2.85c
Nos. 22 and 24	2.75c to 2.90c
Nos. 25 and 26	2.80c to 2.95c
No. 27	2.85c to 3.00c
No. 28	2.90c to 3.05c
No. 29	2.95c to 3.10c
No. 30	3.05c to 3.30c

Bessemer.

GALVANIZED SHEETS OF BLACK SHEET GAGE, PITTSBURGH

Nos. 10 and 11	3.50c to 3.65c
No. 12	3.60c to 3.75c
Nos. 13 and 14	3.60c to 3.75c
Nos. 15 and 16	3.70c to 3.85c
Nos. 17 to 21	3.85c to 4.00c
Nos. 22 and 24	4.05c to 4.20c
Nos. 25 and 26	4.20c to 4.35c
No. 27	4.35c to 4.50c
No. 28	4.50c to 4.65c
No. 29	4.65c to 4.80c

No. 28, black, Chicago	3.09c to 3.19c
No. 28, galvanized, Chicago	5.19c
No. 10, blue annealed, Phila.	3.409c to 3.909c
No. 10, blue annealed, Chgo.	3.24c to 3.44c
Tin plate, 100 lb., coke base	$5.75 to 6.00

IRON AND STEEL PIPE

(Prices Adopted April 21, 1916.)

Steel.

Butt weld:—	Black.	Galv.
⅛, ¼ and ⅜ in.	63	30
½ in.	67	40
⅝ to 3 in.	70	50
Lap weld:—		
2 in.	65	40
2½ to 6 in.	68	48
7 to 12 in.	65	44½
13 and 14 in.	53½	..
15 in.	51	..

Iron.

Butt weld:—	Black.	Galv.
⅛ and ¼ in.	52	19
⅜ in.	53	20
½ in.	57	33
¾ to 1½ in.	60	38
Lap weld:—		
1¼ in.	48	26
1½ in.	54	33
2 in.	55	34
2½ to 4 in.	57	37
4½ to 6 in.	57	37
7 to 12 in.	56	36

BOILER TUBES

Steel, 3½ to 4½ inches, l. c. l.	50 to 52
Iron, 3½ to 4½ inches, l. c. l.	40 to 42

WIRE PRODUCTS

(Retailers' price 5 cents above jobbers' quotations.)

Wire nails, jobbers', Pittsburgh	$2.50 to 2.70
Plain wire, jobbers', Pittsburgh	2.45
Galvanized wire, jobbers', Pbgh.	3.15
Polished staples, Pbgh.	2.65
Galvanized staples, Pbgh.	3.35
Barb wire, painted, jobbers', Pbgh.	2.65
Barb wire, galv., jobbers', Pbgh.	3.35

IRON AND STEEL PRICES

Corrected up to Tuesday noon

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ½ x 6 inches, smaller or shorter, rolled thread, 50 and 10, cut threads, 50, larger or longer, 40.

Machine bolts with hot pressed nuts ½ x 4 inches, smaller or short, rolled 50, 10 and 5; cut, 50 and 5; larger or longer, 40 and 10.

Cold pressed, semi-finished hexagon nuts, 60 and 10.

Gimlet and cone point lag bolts, 50 and 10. Hot pressed square, blank or tapped nuts, $2.90 off list; hot pressed hexagon blank or tapped, $2.90.

Cold pressed square, blank or tapped, $2.60 off; hexagon, blank or tapped, all sizes, $3.00.

RIVETS

Structural rivets, Pbgh	4.25c
Structural rivets, Chgo. delivery	3.50c
Boiler rivets, Pbgh	4.35c
Boiler rivets, Chgo. delivery	3.60c

STEEL SHEET PILING

(Pittsburgh)

Base sizes	2.50c

STANDARD STEELCHAIN

Chain, ½ inch proof coil	5.00c to 5.50c

COLD ROLLED STRIP STEEL

Base price 6.00c to 6.50c per 100 pounds, hard, coils 1½ inches and wider and by .100 inches and heavier.

Extra for Thickness.

0.100-inch and thicker	Base
0.050 to 0.099	$0.05
0.036 to 0.049	0.20
0.035	0.20
0.031 to 0.034	0.35
0.026 to 0.030	0.45
0.020 to 0.024	0.55
0.025	0.45
0.017 to 0.019	1.35
0.015 to 0.016	1.75
0.013 to 0.014	2.45
0.012	2.80
0.011	3.15
0.010	3.50

Other extras as per card of March 15, 1916.

CAST IRON WATER PIPE

Four-inch, Chicago	$33.50 to 34.00
Six-inch and larger, Chicago	30.50 to 31.00
Six-inch Class B, New York	30.50
Four-inch Class B New York	33.50
Four to six-inch Birmingham	28.00
Six-inch and larger Birmingham	25.00

Light weight water and gas pipe $1 per ton higher than standard water.

WAREHOUSE PRICES

Steel bars, Chicago	3.10c
Steel squares, 2-in. & ov., Cleve.	3.75c
Steel rounds, 2-in. & ov., Cleve.	3.75c
Steel bars, under 2 in., Cleveland	3.25c
Steel bars, Detroit	3.25c
Steel bars, Philadelphia	3.25c to 4.10c
Steel bars, New York	3.25c to 3.50c
Steel bars, St. Louis	3.15c
Steel bars, Cincinnati	3.20c to 3.75c
Steel bars, St. Paul	3.20c
Steel bars, over 2-in., Buffalo	4.20c
Steel bars, Buffalo	3.35c
Iron bars, Chicago	3.10c
Iron bars, Cleveland	3.20c
Iron bars, Detroit	3.25c
Iron bars, St. Louis	3.10c
Iron bars, Cincinnati	3.20c to 3.75c
Iron bars, Philadelphia	3.00c to 3.25c
Iron bars, New York	3.25c
Shapes, Chgo.	3.10c
Shapes, Detroit	3.25c
Shapes, St. Louis	3.15c
Shapes, St. Paul	3.20c
Shapes, New York	3.25c to 3.50c
Shapes, Cleveland	3.25c
Shapes, Philadelphia	3.00c to 3.25c
Shapes, Buffalo	3.35c
Shapes and plates, Cincinnati	3.20c to 3.50c
Plates, Chgo.	3.50c
Plates, Detroit	3.60c to 4.00c
Plates, St. Louis	3.55c
Plates, St. Paul	3.60c
Plates, New York	4.25c to 4.50c
Plates, Cleveland	3.65c
Plates, Philadelphia	4.00c to 4.25c
No. 10 blue anl. sheets, Chgo.	3.40c
No. 10 blue anl. sheets, Cleve.	3.50c
No. 10 blue anl. sheets, Buffalo	3.25c
No. 10 blue anl. sheets, St. L.	3.45c
No. 10 blue anl. sheets, Cinci.	3.50c
No. 10 blue anl. sheets, St. Paul	3.50c
No. 10 blue anl. sheets, Detroit	3.55c
No. 28 black sheets, Chgo.	3.20c
No. 28 black sheets, Cleveland	3.20c to 3.25c
No. 28 black sheets, Cinci.	3.40c
No. 28 black sheets, Detroit	3.50c
No. 28 black sheets, St. Louis	3.30c
No. 28 black sheets, St. Paul	3.35c
No. 28 galv. sheets, Chgo.	5.25c to 5.50c
No. 28 galv. sheets, Cleveland	5.25c
No. 28 galv. sheets, Cincinnati	5.25c
No. 28 galv. sheets, Detroit	5.25c
No. 28 galv. sheets, St. Louis	5.30c to 5.50c

Freight Rates, Coke

Connellsville district, per 2,000 lbs., to:—	
Baltimore	$1.80
Buffalo	1.85
Chicago	2.50
Cleveland	1.60
Detroit	2.10
East St. Louis	2.80
Joliet	2.50
Louisville	2.50
Milwaukee	2.85
New York	2.85
Philadelphia	2.05
Pittsburgh	.75
Richmond, Va.	2.94
Toledo	1.85
Valley Furnaces	1.20
Cincinnati	2.00

IRON AND STEEL SCRAP

(Net Tons.)

Angle bars, iron, Chicago	$18.00 to 18.50
Angle bars, steel, St. Louis	12.50 to 13.00
Arch bars and transoms, Chgo.	19.50 to 20.00
Arch bars and transoms, St. L.	19.00 to 20.00
Boiler plate, cut, No. 1, Chgo.	10.50 to 11.00
Boiler plate, cut, No. 1, St. L.	8.50 to 9.00
Boiler punchings, Chicago	14.00 to 14.50
Bundled sheet, Cincinnati	8.25 to 8.75
Busheling, No. 1, Chicago	12.00 to 12.50
Busheling, No. 1, Cincinnati	10.00 to 10.50
Busheling, No. 1, Cleveland	12.00 to 12.75
Busheling, No. 1, St. Louis	10.00 to 10.50
Busheling, No. 2, Chicago	8.75 to 9.25
Cast borings, Chicago	6.00 to 6.50
Cast borings, Cincinnati	5.50 to 6.00
Cast borings, Cleveland	5.75 to 6.00
Cast borings, St. Louis	5.25 to 5.75
Cast, No. 1, Chicago	12.00 to 12.50
Cast, No. 1, Cincinnati	10.50 to 11.00
Cast, No. 1, Cleveland	13.00 to 13.50
Cast, No. 1, St. Louis	9.75 to 10.25

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 lbs. to:—

New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Minneapolis and St. Paul	32.9 cents
Denver	68.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	73.9 cents
Pacific coast (tin plate)	70 cents
Pacific coast, via Panama canal	61.9 cents

Cut forge, Chicago	13.75 to 14.25
Iron axles, St. Louis	21.50 to 22.00
Iron axles, Cleve.	23.00 to 24.00
Knuckles, coup., Chicago	15.50 to 16.00
Knuckles, coup., St. Louis	12.75 to 13.25
Locomtive tires, Chicago	20.00 to 20.50
Locomotive tires, St. Louis	19.50 to 20.00
Machine shop turnings, Chgo.	5.50 to 6.00
Machine shop turnings, Cleve.	6.00 to 6.25
Machine shop turnings, Cinci.	5.50 to 6.00
Machine shop turnings, St. L.	5.25 to 5.75
Malleable agricultural, Chgo.	11.00 to 11.50
Malleable agricultural, St. Louis	10.00 to 10.50
Malleable, Cincinnati	8.25 to 8.75
Malleable railroad, Chicago	12.00 to 12.50
Malleable railroad, St. Louis	11.00 to 11.50
Pipes and flues, Cleveland	11.25 to 11.50
Pipes and flues, Chgo.	10.75 to 11.25
Pipes and flues, St. Louis	9.00 to 9.50
Railroad wrought, No. 1, Chgo.	15.00 to 15.50
Railroad wrought, No. 1, Cleve.	15.00
Railroad wrought, No. 1, St. L.	14.50 to 15.00
Railroad wrought, No. 1, Cinci.	13.00 to 13.50
Railroad wrought, No. 2, Chgo.	14.00 to 14.50
Railroad wrought, No. 2, St. L.	13.50 to 14.00
Shafting, St. Louis	$16.75 to 17.25
Springs, St. Louis	12.75 to 13.25
Springs, Chicago	16.00 to 16.50
Steel car axles, St. Louis	23.00 to 23.50
Steel car axles, Chicago	25.00 to 25.50
Stove plate, Chicago	11.25 to 11.75
Stove plate, Cleveland	10.00
Stove plate, Buffalo	11.00 to 11.50
Stove plate, Cincinnati	8.00 to 8.50
Stove plate, St. Louis	7.00 to 7.50

(Gross tons.)

Axle turnings, Cleveland	$11.50 to 12.00
Busheling, No. 1, Buffalo	13.00 to 13.50
Busheling, No. 1, Pittsburgh	13.00 to 13.50
Busheling, No. 2, Buffalo	11.00 to 11.50
Bundled sheets, Pittsburgh	12.25 to 12.50
Bundled sheets, Cleveland	12.50 to 12.75
Bundled sheets, Buffalo	11.50 to 12.00
Car wheels (iron), Pittsburgh	14.00 to 14.50
Car wheels (steel), Pittsburgh	17.50 to 18.00
Car wheels, Chicago	12.50 to 13.00
Car wheels, eastern Pa.	16.00 to 16.50
Car wheels, Buffalo	13.00 to 13.50
Car wheels, N. Y.	13.75 to 14.00
Car wheels, St. Louis	11.50 to 12.00
Car wheels, Birmingham	10.50 to 11.00
Tram car wheels, B'ham	10.50 to 11.00
Cast borings, New York	7.50 to 8.00
Cast borings, eastern Pa.	10.00 to 10.50
Cast borings, Buffalo	8.00 to 8.25
Cast borings, Pittsburgh	8.50 to 8.75
Cast, No. 1, eastern Pa.	16.00 to 16.50
Cast, No. 1, Pittsburgh	14.75 to 15.00
Cast, No. 1, Birmingham	11.00 to 11.50
Cast, heavy No. 1, N. J. points	16.50 to 17.00
Forge, No. 1, eastern Pa.	13.00 to 13.50
Frogs, switches, guards, St. L.	14.00 to 14.25
Grate bars, Buffalo	11.50 to 12.00
Grate bars, N. J. points	12.50 to 13.00
Heavy axle turnings, Buffalo	12.00
Heavy melting steel, Pbgh	15.50 to 16.00
Heavy melting steel, Buffalo	15.50 to 16.00
Heavy melting steel, Chgo.	14.00 to 14.50
Heavy melting steel, Cleveland	15.00 to 15.25
Heavy melting steel, Cincinnati	13.50 to 14.00
Heavy melting steel, eastern Pa.	14.75 to 15.25
Heavy melting steel, New York	13.25 to 13.50
Heavy melting steel, St. L.	14.25 to 14.75
Heavy melting steel, B'ham	9.50 to 10.00
Iron rails, Chgo.	18.00 to 18.50
Iron rails, Buffalo	18.00 to 18.50
Iron rails, Cincinnati	13.50 to 14.00
Iron rails, St. Louis	16.00 to 16.50
Iron rails, Cleveland	18.00
Iron axles, Pittsburgh	25.50 to 26.00
Iron axles, Cincinnati	20.00 to 20.50
Iron axles, eastern Pa.	27.00 to 28.00
Iron axles, Chicago	25.75 to 26.75
Iron axles, Buffalo	24.00 to 24.50
Low phos. steel, Buffalo	20.00 to 20.50
Low phos. steel, Pbgh	19.50 to 20.50
Low phos. steel, eastern Pa.	21.00 to 22.00
Machine shop turnings, Buffalo	7.00 to 7.50
Mch. shop turnings, New York	7.00 to 7.50
Mch. shop turnings, Pbgh	8.50 to 8.75
Mch. shop turnings, eastern Pa.	8.50 to 9.00
Malleable railroad, Cleveland	14.50 to 15.00
Malleable railroad, Buffalo	15.00 to 16.00
Malleable railroad, Pittsburgh	13.50 to 14.00
Malleable railroad, eastern Pa.	13.00 to 13.50
R. R. and mch. cast, No. 1 Bfl.	15.50 to 16.00
R. R. wrought, No. 1, Buffalo	17.25 to 17.75
R. R. wrgt., No. 1, eastern Pa.	19.50 to 20.00
R. R. wrgt., No. 1, New York	18.00 to 18.50
R. R. wrought, No. 1, Pbgh	18.00 to 18.25
R. R. wrought, No. 1, B'ham	13.00 to 13.50
Reroll. rails, 5 ft. & ov., Pbgh	16.75 to 17.25
Reroll. rails, 5 ft. & ov., Chgo.	15.75 to 16.25
Reroll. rails, 5 ft. & ov., Cleve.	15.00
Reroll. rails, 5 ft. & ov., E. P.	17.00 to 18.00
Reroll. rails, 5 ft. & ov., St. L.	15.25 to 15.75
Shafting, New York	20.00 to 20.50
Shafting, eastern Pa.	20.00 to 21.00
Shoveling steel, Chicago	13.50 to 14.00
Shoveling steel, St. Louis	11.50 to 12.00
Steel rails, short, Chicago	15.50 to 16.00
Steel rails, short, Cleveland	18.50
Steel rails, old, B'ham	11.00 to 11.25
Steel rails, short, St. Louis	14.00 to 14.50
Steel car axles, Birmingham	21.00 to 22.00
Steel car axles, New York	25.00 to 25.50
Steel car axles, Buffalo	24.00 to 24.50
Steel car axles, Cleveland	28.00
Steel car axles, Pittsburgh	26.50 to 27.00
Steel car axles, eastern Pa.	25.00 to 26.00
Stove plate, N. J. points	12.25 to 12.50
Stove plate, Birmingham	10.00 to 10.50
Stove plate, Pittsburgh	10.50 to 10.75
Stove plate, eastern Pa.	12.25 to 12.75
Wrought pipe, New York	10.25 to 10.75
Wrought pipe, eastern Pa.	12.50 to 13.00
Wrought pipe, Buffalo	12.00 to 12.50

"Where-To-Buy"

A classified-by-products list of advertisers for the convenience of readers. If you don't find what you want, write us and we will tell you where to get it. ¶ Index to advertisements will give you page number of any advertiser and by referring to advertisement you can get full particulars about products.

ACETYLENE IN CYLINDERS.
Linde Air Products Co., New York City.
Prest-O-Lite Co., The, Indianapolis, Ind.

ACCUMULATORS.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Mesta Machine Co., Pittsburgh, Pa.
Tod, Wm., Youngstown, O.
United Engrg. & Fdy. Co., Pittsburgh, Pa.
Watson-Stillman Co., New York City.
Wood, R. D., & Co., Philadelphia, Pa.

ACCUMULATORS. (Hydraulic.)
Southwark Fdy & Mch. Co., Philadelphia, Pa.

AEROPLANE WIRE, STRAND AND CORD.
Roebling's, John A., Sons Co., Trenton, N. J.

ALLOYS.
American Vanadium Co., Pittsburgh, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Blackwell, Geo. G., Sons & Co., Ltd., Liverpool, Eng
Bourne-Fuller Co., The, Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Edgertyn Company, Inc., New York City.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
United Steel Co., Canton, O.

ALUMINUM ALLOYS.
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM. (Granulated.)
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM. (Solder.)
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM. (Vanadium.)
American Vanadium Co., Pittsburgh, Pa.

ALUMINUM INGOTS.
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM RODS. (Sheet.)
United Smelt'g & Alum. Co., New Haven, Ct.

ANGLES, TEES, CHANNELS.
(See Steel, Structural.)

ANNEALING BOXES AND POTS.
Mesta Machine Co., Pittsburgh, Pa.
Pittsburgh Annealing Box Co., Pittsburgh, Pa.
Pittsburgh Malleable Iron Co., Pittsburgh, Pa.
Pittsburgh Valve Foundry & Const. Co., Pittsburgh, Pa.
Swedish Crucible Steel Co., Detroit, Mich.
United Engrg. & Foundry Co., Pittsburgh, Pa.
Zanesville Malleable Iron Co., Zanesville, O.

ANTIMONY.
Foote Mineral Co., Philadelphia, Pa.

ARMATURES.
Crocker-Wheeler Co., Ampere, N. J.
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

ASH BUCKETS.
Lakewood Engrg. Co., Cleveland, O.

AXLES.
American Bridge Co., New York City.
Bethlehem Steel Co., So. Bethlehem, Pa.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
National Tube Co., Pittsburgh, Pa.
Otis Steel Co., Cleveland, O.

BABBITT METAL.
Lubricating Metal Co., The, New York City.
Lumen Bearing Co., Buffalo, N. Y.

BAKERS, WIRE COATING.
Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BALLS. (Steel.)
Bethlehem Steel Co., The, So. Bethlehem, Pa.
New Departure Mfg. Co., Bristol, Conn.

BANDS. (Steel.)
Carnegie Steel Co., Pittsburgh, Pa.

BARGES. (Steel.)
American Bridge Co., New York City.

BARRELS, TUMBLING. (Wire Nails.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BARS—ALLOY.
Central Steel Co., The, Massillon, O.

BARS. (Concrete Reinforcing.)
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Inland Steel Co., Chicago, Ill.
Laclede Steel Co., St. Louis, Mo.
Ryerson, Jos. T., & Son, Chicago, Ill.
Trussed Concrete Steel Co., Detroit, Mich.
Upson Nut Co., Cleveland, O.

BARS. (Iron and Steel.)
American Bridge Co., New York, N. Y.
American Iron & Steel Mfg. Co., Lebanon, Pa.
Belmont Iron Works, Philadelphia, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Brown-Wales Co., Boston, Mass.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Harvey, Arthur C., Co., Boston, Mass.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Co., Warehouse Dept., Chicago, Ill
Illinois Steel Warehouse Co., St. Louis, Mo.
Illinois Steel Warehouse Co., St. Paul, Minn.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburgh, Pa.
Lackawanna Steel Co., Buffalo, N. Y.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Milton Mfg. Co., Milton, Pa.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Standard Gauge Steel Co., Beaver Falls, Pa.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Trussed Concrete Steel Co., Detroit, Mich.
United Steel Co., Canton, O.
Upson Nut Co., Cleveland, O.

BEAMS, CHANNELS AND ANGLES.
Belmont Iron Works, Philadelphia, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Franklin Steel Works, Franklin, Pa.
Illinois Steel Co., Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.

BEARINGS. (Ball.)
New Departure Mfg. Co., Bristol, Conn.

BEARINGS. (Vanadium Steel.)
American Vanadium Co., The, Pittsburgh, Pa.

BELLS. (Marine and Locomotive.)
Vanduzen, E. W., Co., The, Cincinnati, O.

BELT CEMENT AND DRESSING.
Dixon, Jos., Crucible Co., Jersey City, N. J.
Graton & Knight Mfg. Co., Worcester, Mass.
Texas Company, The, New York City.
Williams, I. B., & Sons, Dover, N. H.

BELT LACING. (Leather.)
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.
Williams, I. B., & Sons, Dover, N. H.

BELTING. (Chain.)
Link-Belt Co., Chicago, Ill.

BELTING—LEATHER.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.
Williams, I. B., & Sons, Dover, N. H.

BENCHES. (Steel.)
New Britain Mach. Co., New Britain, Conn.

BENCHES AND FRAMES. (Drawing.)
Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., The, Cuyahoga Falls, O.

BENDING AND STRAIGHTENING MACHINES.
Abramsen Engrg. Co., Pittsburgh, Pa.
Bertsch & Co., Cambridge City, Ind.
Birdsboro St'l Fdy. & Mch. Co., Birdsboro, Pa.
Cleveland Punch & Shear Works Co., Cleveland, O.
Covington Machine Co., Covington, Va.
Espen-Lucas Machine Works, Philadelphia, Pa.
Hinman, D. A., & Co., Sandwich, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Niles-Bement-Pond Co., New York, N. Y.
United Engrg. & Fdy. Co., Pittsburgh, Pa.
Watson-Stillman Co., New York, N. Y.

BENZOL RECOVERY PLANTS.
Koppers, H., Co., Pittsburgh, Pa.

BILLETS.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Illinois Steel Co., Chicago, Ill.
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., Buffalo, N. Y.
Otis Steel Co., Cleveland, O.
Republic Iron & Steel Co., Youngstown, O.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Upson Nut Co., Cleveland, O.
Whitaker-Glessner Co., Portsmouth Works, Portsmouth, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sheet & Tube Co., Youngstown.

BLAST FURNACE SKIP CARS.
Lakewood Engrg. Co., Cleveland, O.

BLAST FURNACE VOLUME METERS.
Clark, Chas. J., Chicago, Ill.

BLOCKS.
Bethlehem Steel Co., The, So. Bethlehem, Pa.

BLOOMS.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Hillman, J. H., & Sons, Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., Buffalo, N. Y.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Upson Nut Co., Cleveland, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sh't & Tube Co., Youngstown, O.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above